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TRANSCRIPT OF RECORD.

SUPREME COURT OF THE UNITED STATES.

OCTOBER TERM, 1887.

No. ~~271.~~ 25

THE VACUUM OIL COMPANY, APPELLANT,

vs.

THE BUFFALO LUBRICATING OIL COMPANY, (LIMITED.)

APPEAL FROM THE CIRCUIT COURT OF THE UNITED STATES FOR THE NORTHERN DISTRICT OF NEW YORK.

FILED AUGUST 13, 1885.

SUPREME COURT OF THE UNITED STATES.

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No. 271.

THE VACUUM OIL COMPANY, APPELLANT,

vs.

THE BUFFALO LUBRICATING OIL COMPANY, (LIMITED.)

APPEAL FROM THE CIRCUIT COURT OF THE UNITED STATES FOR THE NORTHERN DISTRICT OF NEW YORK.

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1 *Statement.*

United States Circuit Court, Northern District of New York.

THE VACUUM OIL COMPANY
vs.
BUFFALO LUBRICATING OIL COMPANY, Limited. } No. 3748.

The complainant in the above-entitled cause filed its bill of complaint against the defendant herein on the 25th day of April, 1882, which bill is hereto annexed.

A subpœna to appear and answer in said cause was thereupon issued, which subpœna was duly served, and on the 8th day June, 1882, the defendant duly appeared by Corlett & Hatch, as its solicitors.

On the 2nd day of October, 1882, the defendant filed its answer to the bill of complaint herein, which answer is hereto annexed.

On the first day of December, 1882, the complainant filed its replication to the said answer, which replication is hereto annexed.

Testimony was thereafter taken by and on behalf of the respective parties, and on the 23d day of January, 1885, the said cause was brought to a hearing and argued by counsel, upon pleadings and proofs, before the Hon. William J. Wallace at a term of this court held at Albany.

On the 23d day of January, 1885, at a term of this court held at Albany—present, the Hon. William J. Wallace, judge—a
2 decree in favor of the defendant was duly made and entered herein, which decree is hereto annexed.

On the 20th day of January, 1885, a petition for an amendment to bill and a rehearing was filed by complainant and an order to show cause thereon entered and returnable at the March term, which petition and order are hereto annexed.

On the 17th day of March, at a term of this court held at Utica—present, Hon. William J. Wallace—an order was made and entered granting a rehearing and allowing an amendment to the bill of complaint, which order is hereto annexed.

On the 17th day of March, 1885, at a term of this court held at Utica—present, the Hon. William J. Wallace—a rehearing was had and a decision in favor of the defendant rendered, and on said 17th day of March, 1885, a final decree was made and entered dismissing complainant's bill with costs to defendant, which decree is hereto annexed.

Thereafter, and on the 30th day of March, 1885, the defendant's costs and disbursements were duly taxed and adjusted by the clerk of this court at $370.12.

3 *Bill of Complaint.*

United States Circuit Court, Northern District of New York. In Equity.

THE VACUUM OIL COMPANY
vs.
THE BUFFALO LUBRICATING OIL COMPANY, Limited. } No. 3748.

To the honorable the judges of the circuit court of the United States in and for the northern district of New York:

The Vacuum Oil Company, a corporation organized and operating under the laws of the State of New York and having its principal place of business in Rochester, in said State, brings this bill against the Buffalo Lubricating Company, Limited, a corporation organized and operating under the laws of the State of New York and having its principal place of business in Buffalo, in said State.

And thereupon your orator complains and says that heretofore and before the 3d day of September, 1867, Hiram B. Everest, of said Rochester, was the true, original, and first inventor of a certain new and useful improvement in apparatus for distilling petroleum not known or used before and not in public use or on sale for more than two years prior to his application for a patent therefor.

4 And your orator further shows unto your honors that on or about the 17th day of August, 1867, the said Hiram B. Everest, so being the inventor of said improvement and having made due application for letters patent therefor, as hereinafter set forth, by an assignment in writing of that date, sold, assigned, and transferred unto your orator all his right, title, and interest in and to the said invention in consequence of the grant of letters patent therefor and the full and exclusive right to the improvement made by him, as fully set forth and described in the specification which he had prepared and executed preparatory to obtaining letters patent therefor.

And your orator further shows unto your honors that the said Hiram B. Everest, so being the inventor of said improvement, made application to the proper department of the Government of the United States for letters patent in accordance with the then existing acts of Congress and duly complied in all respects with the conditions and requirements of said acts of Congress, and that on the 3d day of September, 1867, letters patent of the United States numbered 68426, signed, sealed, and executed in due form of law, were issued to your orator as assignee of said Everest, whereby there was secured to your orator, its successors or assigns, for the term of seventeen years from the 3d day of September, 1867, the full and exclusive right of making, using, or vending the said invention or discovery throughout the United States and the Territories thereof.

And your orator further shows that your orator has extensively applied the said improvement to practical use and has been and, but for the infringement hereinafter complained of, would still be in the undisturbed possession, use, and enjoyment of the exclusive privileges secured by the said letters patent and in receipt of the profits of the same.

5 And your orator further shows unto your honors, as it is informed and believes, that the said defendant hereinbefore named, well knowing all the facts hereinbefore set forth, is now making, using, and vending the said patented improvement or an improvement in some parts thereof substantially the same in construction and operation as in the said letters patent mentioned, the exclusive right and privilege to make, use, and vend which is thus by law vested in your orator.

And so it is, may it please your honors, that the said defendant, as your orator is informed and believes, without the license of your orator, after due service of notice of infringement, against the will of your orator and in violation of its rights, has made, sold, and used, and intends to continue still to make, sell, and use, the said patented improvement within the northern district of New York, all of which is in violation of the said letters patent.

To the end, therefore, that the defendant may, if it can, show reason why your orator should not have the relief hereby prayed, and that it may make a full disclosure and discovery of all the matters and things aforesaid, and upon its corporal oath and according to the best and utmost of its knowledge, remembrance, information, and belief full, true, direct, and perfect answer make to the several allegations of this bill, as though specially interrogated relative thereto;

And now, to the end that the defendant may be compelled to account for and pay over the income thus unlawfully derived from the violation of the rights of your orator as above and be restrained from any further violation of said rights, your orator prays that your honors may grant a writ of injunction, restraining the defendant from any further construction or making or sale or use in any
6 manner of said patented improvement or any part thereof, in violation of the rights of your orator as aforesaid, and that the improvements now in possession or use of the said defendants may be destroyed or delivered up to your orator for that purpose; and also that your honors upon the rendering of the decree for an infringement, as above prayed for, may proceed to assess or cause to be assessed, under your direction, in addition to the profits to be accounted for by the defendants as aforesaid, the damages your orator has sustained by reason of such infringement; and that your honors may increase the actual damages so assessed to a sum equal to three times the amount of such assessment, under the circumstances of the wilful and unjust infringement by said defendant as herein set forth. And your orator prays also for a provisional or preliminary injunction, and for such other relief as the equity of the case may require and to your honors may seem meet.

May it please your honors to grant unto your orator not only a writ of injunction, conformable to the prayer of this bill, but also a writ of subpœna of the United States of America, directed to the said The Buffalo Lubricating Oil Company, Limited, and commanding it to appear and answer unto this bill of complaint, and to abide and perform such order and decree in the premises as to the court shall seem meet and be required by the principles of equity and good conscience.

VACUUM OIL CO.,
CHAS. M. EVEREST,
Vice-President.

THOMAS G. OUTERBRIDGE,
Solicitor and Counsel for Complainant.

7 UNITED STATES OF AMERICA,
Northern District of New York, County of Monroe, } *ss:*

Charles M. Everest, being duly sworn, says that he is the vice-president of the complainant named in the foregoing bill; that he has read said bill, and that the same is true to his own knowledge, except as to the matters therein stated to be alleged on information and belief, and as to those matters he believes it to be true.

And deponent further says that he verily believes the said Hiram B. Everest in said bill named to be the original, true, and first inventor of the new and useful improvement which is described in the letters patent granted to the complainant and mentioned in the foregoing bill. And deponent further says that the matters and things set forth in said bill come peculiarly within the province of deponent, which is the reason this verification is made by this deponent; and deponent verily believes that the title of complainant as set forth in said bill is true.

CHAS. M. EVEREST.

Sworn to and subscribed this 17th day of April, A. D. 1882, before me—

[L. S.] FRED. P. WILCOX,
Notary Public.

(Indorsed:) 3748. U. S. circuit court, N. dist. of New York. The Vacuum Oil Company *vs.* Buffalo Lubricating Oil Company. Bill of complaint. T. G. Outerbridge, compl't's solicitor, 105 Powers' Block, Rochester, N. Y. Filed Apr. 25, 1882. William H. Bright, clerk.

8 *Order.*

In the Circuit Court of the United States for the Northern District of New York.

THE VACUUM OIL CO.
vs.
BUFFALO LUBRICATING OIL CO. } 3748.

UTICA, *April* 25, 1882.

Present: Hon. Wm. J. Wallace, judge.

On filing bill of complaint in this cause, and on motion of T. G. Outerbridge, solicitor for complainant—

Ordered, That a writ of subpœna do issue out of and under the seal of this court pursuant to the prayer of said bill, and that this cause be docketed for said complainant.

9 *Subpœna.*

The President of the United States of America to Buffalo Lubricating Oil Company, Limited, Greeting:

You are hereby commanded that you personally appear before the judges of the circuit court of the United States for the northern district of New York, in the second circuit, on the first Monday in June, 1882, to answer to a bill of complaint exhibited against you in said court by the Vacuum Oil Company, and to do further and receive whatever said court shall have considered in that behalf; and this you are not to omit under the penalty of two hundred and fifty dollars.

Witness the Honorable Morrison R. Waite, Chief Justice of the Supreme Court of the United States, at the city of Utica, in said northern district, the 25th day of April, eighteen hundred and eighty-two.

[L. S.] WILLIAM H. BRIGHT, *Clerk.*

T. G. OUTERBRIDGE,
Solicitor for Complainant.

MEMORANDUM.—The defendant is to enter his appearance in the suit above mentioned, in the clerk's office, at Utica, on or before the day at which the above subpœna is returnable; otherwise the bill may be taken *pro confesso.*

WILLIAM H. BRIGHT, *Clerk.*

(Indorsed:) No. 3748. United States circuit court, northern district of New York. The Vacuum Oil Co. *vs.* Buffalo Lubricating Oil Co., Limited. Equity subpœna. T. G. Outerbridge, complainant's solicitor. Filed May 29, 1882. William H. Bright, clerk.

10 *Appearance.*

United States Circuit Court, Northern District of New York.

THE VACUUM OIL COMPANY
against
BUFFALO LUBRICATING OIL COMPANY, Limited. } No. 3748.

To William H. Bright, Esq., clerk of circuit court, and T. G. Outerbridge, Esq., pl'ff's solicitor:

Take notice that the defendant appears by Corlett & Hatch, its solicitors and attorneys in the above-entitled action.

Yours, &c., CORLETT & HATCH,
Solicitors & Att'ys for Def't.

Dated June 7th, 1882.
Office & P. O. address, No. 248 Main St., Buffalo, N. Y.

(Indorsed:) No. 3748. United States circuit c't, north. dist. of New York. The Vacuum Oil Co. ag'st The Buffalo Lubricating Oil Co., Limited. Appearance. Corlett & Hatch, def't's solicitors & att'ys, 248 Main St., Buffalo, N. Y. Filed Jun. 8, 1882. William H. Bright, clerk.

11 *Order.*

In the Circuit Court of the United States for the Northern District of New York.

THE VACUUM OIL CO.
vs.
BUFFALO LUBRICATING OIL CO. } 3748.

UTICA, *June* 8, 1882.

Present: Hon. Wm. J. Wallace, judge.

On filing *præcipe* in this cause, and on motion of Corlett & Hatch—

Ordered, That their appearance as solicitors for the defendant herein be, and the same is hereby, entered, and that this cause be now docketed for said defendant.

12 *Answer.*

United States Circuit Court, Northern District of New York. In Equity.

VACUUM OIL COMPANY, Complainant,
vs.
BUFFALO LUBRICATING OIL COMPANY, Limited, Defendant. } No. 3748.

The answer of The Buffalo Lubricating Oil Company, defendant, to the bill of complaint of the above-named complainant.

The defendant, now and at all times hereafter, saving and reserving to itself all manner of benefit and advantage of exception which may be had or taken to the many errors, uncertainties, and insufficiencies in the said bill of complaint contained, for answer to the said bill or unto so much and such parts thereof as this defendant is advised it is material for it to make answer unto, answers 13 and says that the defendant admits letters patent of the United States were issued under date of September 3d, A. D. 1867, and numbered 68426, to the complainant, as assignee of Hiram B. Everest, named in said bill of complaint, for an alleged improvement in apparatus for distilling petroleum, but the defendant denies that the said Hiram B. Everest was the true, original, or first inventor of the said improvement, and denies that the same was not known or used before the alleged invention thereof by said Everest, and denies that the same was not in public use or on sale before the application of said Everest for a patent therefor.

And the said defendant, further answering, says that it does not know and is not informed, save by said bill of complaint, whether or not the said Hiram B. Everest assigned or transferred his right, title, or interest in or to the alleged inventions set forth in said letters patent to the said complainant or any right or title thereto, as alleged in said bill of complaint, and the said defendant leaves the said complainant to make such proofs respecting the said alleged assignment as it may be advised is material.

And the said defendant, further answering, denies that but for the alleged infringement complained of in the said bill of complaint the complainant would be in the undisturbed possession, use, or enjoyment of the exclusive privileges which purport to be secured by the said letters patent or in receipt of the profits of the same.

And the said defendant, further answering, denies that the said defendant is now making, using, or vending the said patented improvement or an improvement in some parts thereof substantially the same in construction and operation as in the said letters patent mentioned, or that the defendant has in any manner infringed on the rights of the complainant under the said letters patent, and
denies that the said defendant has made, sold, or used or
14 intends to continue still to make, sell, or use the said alleged
patented improvement.

And the said defendant, further answering on information and belief, says that the said Hiram B. Everest, named in said bill of complaint, was not the original and first inventor of the alleged invention or improvement described and claimed in the said letters patent numbered 68426, or of any material or substantial part thereof, but that the same, prior to the supposed invention thereof by the said Hiram B. Everest, had been patented and described in letters patent issued and granted by the Government of the United States to the following-named persons and at the following times, viz:

Herbert W. C. Tweddle, dated and granted February 4th, 1862, No. 34324; reissued November 27th, 1866, No. 2404, the reissue dated and granted the day last named.

Abraham Quinn, dated and granted September 16, 1862, No. 36481.

Huot Flewry, dated and granted October 24, 1865, No. 50571.

William G. W. Jaeger, dated and granted May 1, 1866, No. 54358, antedated April 16, 1866.

M. P. Ewing, dated and granted July 31, 1866, No. 56852.

E. G. Kelley and A. H. Tait, dated and granted June 18, 1861, No. 1564.

Samuel M. Mott, dated and granted July 23, 1861, No. 1881.

M. P. Ewing, dated and granted September 11, 1866, No. 58020.

John Ellis and Edward C. Kattell, dated and granted April 16, 1867, No. 63789.

Alexis Thirault, assignor to himself and B. S. Hilton, granted April 16, 1867, antedated April 15, 1867, No. 63963.

15 Samuel M. Hawes, dated and granted April 12, 1853, No. 9662.

James Riley and William Allen, dated and granted March 22, 1853, No. 9627.

William Brown, dated and granted September 27, 1853, No. 10055.

George H. S. Duffus, dated and granted January 31, 1865, No. 46090.

Lewis S. Fales, dated and granted September 5, 1865, No. 49739.

O. Lugo, dated and granted September 18, 1866, No. 58113.

James Perkins and William H. Burnett, dated and granted April 4, 1865, No. 47125.

John C. Pedrick, dated and granted August 13, 1867, No. 67796.

A. D. Hegham, dated and granted April 24, 1866, No. 54157.

John Howarth, dated and granted May 17, 1864, No. 42772.

J. L. Alberger, dated and granted March 3d, 1863, No. 37798.

Cyrus M. Warren, dated and granted April 11, 1865, No. 47235.

Edward Braggins, dated and granted March 7, 1865, No. 46633.

James J. Johnston, dated and granted June 20, 1865, No. 48285.

Adolph Millochan, dated and granted March 13, 1866, No. 53167.

William H. Bayless, dated and granted May 29, 1847, No. 5136.

Augustus H. Tait and Joseph W. Avis, dated and granted March 20, 1866, No. 53359.

Samuel Andrews, dated and granted September 25, 1866, No. 58197.

16 And the defendant, further answering, says that long prior to the said supposed invention by the said Hiram B. Everest the said alleged invention and improvement were described in a printed publication entitled as follows:

"The manufacture of Photogenic or Hydrocarbon Oils from coal and other bituminous substances capable of supplying burning fluids, by Thomas Antisell, M. D., professor of chemistry in the medical department of Georgetown College, D. C., etc., etc. New York: D. Appleton & Co., 346 and 348 Broadway. London: 16 Little Britain, 1860," at pages 107 and 108 and elsewhere, and also in a printed publication entitled as follows:

"Chemistry, Theoretical, Practical, and Analytical, as applied and relating to the Arts and Manufactures, by Dr. Sheridan Muspratt, F. R. S., E. M. R. I. A. F. G. S. Vol. II. William MacKenzie, Glasgow, Edinburgh, London, and New York," at page 984 and elsewhere.

And the defendant, further answering, says, on information and belief, that the alleged invention in said letters patent to the complainant described had been in public use and on sale in this country for more than two years prior to the application of said Hiram B. Everest for letters patent therefor by the following-named persons at and residing at the following places, viz:

Names.	Residence.	Where used or known.
Matthew Hodkinson	Hilton, Allegheny Co., Pa.	Rochester, Beaver Co., and Marietta, O.
Samuel Gibbons	Cleveland, Ohio	Newton Creek, N. Y.
George Duryea	New York City, N. Y.	Sidioute, Pa., and elsewhere.
Henry Naylor	Oil City, Pa.	Lawrenceville, now part of Pittsburgh, Pa.
Thomas D. Hodkinson	Pittsburgh, Pa.	Rochester, Pa., Marietta, Ohio., and elsewhere.
William L. Greenhill	Marietta, Wash'n Co., O.	Marietta, O., and elsewhere.
William B. Eastman	Brooklyn, N. Y.	Brooklyn, N. Y., and Titusville, Pa.
17		
Paine, Ablett & Co.	Pittsburgh, Pa.	Pittsburgh, Pa.
Wallover Oil Company	Smith's Ferry, Pa.	Smith's Ferry, Pa.
Benjamin Taylor	Buffalo, N. Y.	Cleveland, O., and elsewhere.
A. A. Miller	Rochester, N. Y.	Rochester, N. Y.
John Wallover	Smith's Ferry, Pa.	Smith's Ferry, Pa.

and by other persons whose names defendant cannot now fully set forth, and which it begs leave hereafter to insert in this answer; and said defendant says, on information and belief, that prior to the supposed invention of said patented improvement by the said Hiram B. Everest the said thing patented was known to and used by the persons above specified, at the places respectively above specified, and that the residences of such persons are, respectively, as above specified, and that the said letters patent issued to the said complainant, set forth in said bill of complaint, are null and void.

And this defendant, further answering, denies that the said complainant is entitled to the relief or any part thereof in its said bill of complaint demanded, and this defendant prays the same advantage of the facts and things herein set forth as if for the reason thereof the said bill had been demurred to where a demurrer would have been proper, and the same benefit thereof as if they had been specially pleaded to the said bill where a plea would have been proper.

And this defendant submits to this honorable court that the said complainant has no right to any further answer to said bill or any part thereof than is hereinabove contained, and no right to any injunction, account, or other relief prayed for in said bill, and this defendant prays to be hence dismissed with its reasonable costs and charges in this behalf most wrongfully sustained.

BUFFALO LUBRICATING OIL CO., LIMITED.
C. B. MATTHEWS, *President.*

JAMES A. ALLEN, *of Counsel.*

18 STATE OF NEW YORK,
Northern District of New York, County of Erie, } *ss:*

On this 28th day of September, A. D. 1882, before me personally appeared Charles B. Matthews, and made oath that he is now and for some time past has been president of the Buffalo Lubricating Oil Company, Limited, the corporation named as defendant in the foregoing answer, and that by means of his said office he has acquired and possesses, as he verily believes, greater and more particular knowledge of the matters stated in said answer than any other officer or member of the said corporation, inasmuch as the said matters fall particularly within the sphere of duties of deponent as such president; that he has read the above answer subscribed by him and knows the contents thereof, and that the same is true of his own knowledge, except as to the matters which are therein stated to be on the information and belief of the defendant, and that as to those matters he believes it to be true.

HARLOW C. CURTISS,
Notary Public in and for Erie County, N. Y.

(Indorsed:) 3748. United States circuit court, northern district of New York. In equity. The Vacuum Oil Company, complainant, *vs.* The Buffalo Lubricating Oil Company, Limited, defendant. Answer. Corlett & Hatch def't's sol'rs, Buffalo, N. Y. Filed Oct. 2, 1882.

19 *Amendment to Answer.*

United States Circuit Court, Northern District of New York. In Equity.

THE VACUUM OIL COMPANY, Complainant,
vs.
THE BUFFALO LUBRICATING OIL COMPANY, Limited, Defendant.
} No. 3748.

It is hereby stipulated by and between the respective parties in the above-entitled cause that the defendant's answer in said cause be, and the same is hereby, amended as of the date of the original answer by inserting therein at the foot of the list of patents set up as anticipatory of the letters patent set forth in the bill of complaint, and after the words "Augustus H. Lait and Joseph W. Avis, dated and granted March 20th, 1866, No. 53359," the following, viz:

"P. H. Vanderweyde, dated and granted September 11, 1866, antedated August 8th, 1866, No. 58005.

Henry P. Gengembre, dated and granted June 21, 1859, No. 24454.

Jacob Reese, dated and granted May 19, 1863, No. 38602.

E. N. Horner, dated and granted January 25th, 1859, No. 22727.

And that prior to the said supposed invention by the said Hiram B. Everest the alleged invention or improvement described and claimed in said letters patent number 68426 had been patented and described in letters patent issued and granted by the Queen of Great Britain and Ireland to the following-named persons and at the following times, viz:

20 William Arnaud Gilbee, dated December 27th, 1858, No. 2958. Specification filed June 24th, 1859.

George Hamilton, dated January 18th, 1859, No. 149. Specification filed July 16th, 1859.

Constant Bontigny, dated December 18th, 1852, No. 1105. Specification filed June 18th, 1853."

And also that the said answer be, and the same is hereby, further amended as of the date of said original answer by inserting therein, after the words "William Mackenzie, Glasgow, Edinburgh, London, and New York, at page 984, and else," the following, viz:

"And also in a printed publication entitled as follows:

A Practical Treatise on Coal, Petroleum, and other Distilled Oils, by Abraham Gessner, M. D. F. G. S.; second edition; revised and enlarged by George Weltden Gessner, consulting chemist and engineer; New York—Ballière Brothers, 520 Broadway; London—H. Baillière, 219 Regent St.; Melbourne—F. Baillière, Collins St.; Paris—J. B. Ballière et Fils, Rue Hautefeuille; Madrid—C. Bailly Baillière, Calle del Principe, 1865."

T. G. OUTERBRIDGE,
Compl't's Solicitor.
JAMES A. ALLEN,
Of Counsel for Def't.

(Indorsed:) United States circuit court, northern dist. of New York. In equity. No. 3748. The Vacuum Oil Company, complainant, *v.* Buffalo Lubricating Oil Company, defendant. Stipulation amending answer. Corlett & Hatch, def't's solicitors. Filed Mar. 26, 1885. W. S. Doolittle, clerk.

21 *Replication.*

United States Circuit Court, Northern District of New York. In Equity.

THE VACUUM OIL COMPANY
vs.
BUFFALO LUBRICATING OIL COMPANY, Limited. } No. 3748.

The replication of the Vacuum Oil Company, complainant, to the answer of the Buffalo Lubricating Oil Company, Limited, defendant.

This repliant, saving and reserving all and all manner of advantage of exception to the manifold insufficiences of the said answer, for replication thereunto, says that it will aver and prove the said bill to be true, certain, and sufficient in the law to be answered unto, and that the said answer of the said defendant is uncertain, untrue, and insufficient to be replied unto by this repliant, without this, that any other matter or thing whatsoever in the said answer contained material or effectual in the law to be replied unto and not herein and hereby well and sufficiently replied unto, confessed and avoided, traversed or denied, is true; all which matters and things this repliant is and will be ready to aver and prove as this honorable court shall direct, and humbly prays as in and by the said bill it has already prayed.

THOMAS G. OUTERBRIDGE,
Solicitor and Counsel for Complainant,
105 *Powers Block, Rochester, N. Y.*

(Indorsed:) 3748. U. S. circuit court, N. dist. of N. Y. The Vacuum Oil Company *vs.* Buffalo Lubricating Oil Company, Limited. Replication. T. G. Outerbridge, compl't's solicitor. Filed Dec. 1, 1882. William H. Bright, clerk.

22 *Motion for Extension.*

United States Circuit Court, Northern District of New York. In Equity.

The Vacuum Oil Company, Complainant, *vs.* Buffalo Lubricating Oil Company, Limited, Defendant. } No. 3748.

Sir: Please to take notice that upon the pleadings and proofs which have been taken in the above-entitled cause and all the papers and documents on file in the said cause with the clerk of this court, together with the patent exhibits heretofore produced in evidence on the part of the defendant, and the affidavit, with a copy of which you are herewith served, a motion will be made on the part of the defendant in said cause at the next term of said court, appointed to be held at the court-house, in the village of Canandaigua, in the county of Ontario, on the third Tuesday in June, A. D. 1884, at the opening of the court on that day, or as soon thereafter as counsel can be heard, for an order of said court enlarging the time in said cause within which the proofs therein on the part of the defendant may be taken, authorizing the said defendant to recall for further examination in said cause the witness, Edward Wilhelm, its mechanical expert, in reply to testimony of the defendant's expert, Osgood, and directing that the said cause be stricken from the calendar of the above-mentioned term of said court, and for
23 such other or further order and relief in the said cause as the court may grant.

Dated June 7th, 1884.

CORLETT AND HATCH,
Defendant's Solicitors, Buffalo, N. Y.

To Thomas G. Outerbridge, Esq, defendant's solicitor, 105 Powers' Block, Rochester, N. Y.

Northern District of New York, } *ss:*
County of Erie,

United States Circuit Court, Northern District of New York. In Equity.

The Vacuum Oil Company, Complainant, *vs.* Buffalo Lubricating Oil Company, Limited, Defendant. } No. 3748.

Charles B. Mathews, being duly sworn, deposes and says that he is the president of the corporation defendant in this cause; that his

counsel therein is Mr. James A. Allen, who resides in the city of Buffalo, in said district, and that he has a good and substantial defense in the said cause on the merits, as he is advised by his said counsel after fully and fairly stating to him the facts in the said cause; that the said suit is brought for alleged infringement of letters patent to Hiram B. Everest, dated September 3, 1867, No. 68426, for improvement in apparatus for distilling petroleum; that
24 the specification of said letters patent, as printed by the United
States Patent Office, occupies eight columns of type and contains fourteen several and distinct claims; that in said cause the opening proofs were taken in the month of February, 1883; that the proofs on the part of the defense were taken in the summer of 1883, and consisted of documentary evidence, substantially specifications of prior letters patent of the United States, numbered, consecutively, from A to Y, and the testimony of Edward Wilhelm in explanation of the said patent exhibits as a mechanical expert; that the taking of rebutting proofs on the part of the complainant in said cause was commenced on the 25th day of January, 1884, and continued until the 30th day of May, 1884, at which time, at the instance of the complainant's solicitor, further proceedings were adjourned to the 2d day of June inst.; that the defendant's counsel did not attend on said 2nd day of June, but was informed, as deponent is advised, that at that time the complainant's counsel would have a redirect examination of the defendant's expert, Osgood; that on the 3rd day of June, before any notice had been given to the defendant's solicitors or counsel that the testimony was deemed by the complainant to be closed, a notice of final hearing in the cause was served on a clerk of the defendant's solicitors, who inadvertently gave admission of service thereof, but on being informed of the situation of the said cause on the same day returned to the complainant's solicitor the said notice declining to receive the said — and rescinding the admission of service; that in the opening proofs of the complainant in the said cause infringement was claimed to have been committed by the defendant of ten out of the fourteen claims of
25 said letters patent; that in regard to some of the said claims
the substantial defense on the part of the defendant was that it had not infringed the same, but that as to the greater number of the same the principal ground of defense was the invalidity of such claims, owing to want of novelty or patentable quality of invention; that the proofs given in said cause on the part of the complainant in reply to those of the defendant consisted solely of the testimony of its mechanical expert, Rufus F. Osgood, in connection with the defendant's said patent exhibits, and such testimony was limited to four claims of the said letters patent, as to which, as deponent is advised by its said counsel, the burden of proof rests upon the defendant to sustain the invalidity of the said claims; that in the testimony of said Osgood the said patent exhibits put in evidence by defendant have been reviewed at great length with respect to said four claims, and the conclusion asserted in respect to each of said claims — that the same is not shown invalid by any matter appearing in the said exhibits; that a large number of statements have been

made by said Osgood of matters of science and skill as expert in such closing deposition bearing upon the special constructions of different devices set up as anticipations, and as to the conditions of the operation of the same distinguishing the same from said Everest's alleged invention, or as to the want of practical or successful operation of the same, which appear in such deposition for the first time in the case and which have not been met or in any manner adverted to by anticipation in the previous deposition of the 26 said defendant's said expert, Wilhelm; that deponent is advised by its said counsel in said cause that it cannot safely proceed to a final hearing upon the pleadings and proofs in the said cause without recalling for further examination the said defendant's expert, Wilhelm, in reply to such statements of new matters above referred to as made in the said deposition of said Osgood; that until the recall of said Osgood deponent, acting for the defendant, and the defendant's counsel in said cause were unable to ascertain upon which of the claims in the said complainant's patent the complainant would expect principally to rely at the hearing, and that therefore such particular attention to the matters bearing upon the said four claims referred to as is required by the present state of the case could not have been given in advance, and that many of the statements made are positions taken by the complainant's expert in such second deposition operate as a surprise upon the defendant; that the whole trial of the said cause with respect to the said four claims rests upon a comparison, with the guidance and assistance of proper expert knowledge and skill, of such claims and the matters therein contained and referred to with the alleged anticipatory devices and forms of apparatus contained in large numbers of the said patent exhibits; that deponent is advised by its said counsel in said cause that the defendant having the burden of proof with respect to the alleged invalidity of the said four claims, and the deposition of said Osgood containing numerous statements of new matters relating to the same as aforesaid; that the said defendant, by its said 27 expert, is properly entitled to reply thereto, to the end that the said cause may be fully and fairly tried upon its merits.

Deponent further says that the said defendant has two other causes, in which the said complainant or its president, Everest, is complainant, pending in this court, each of which is a much earlier issue than the present cause, and both of which have been noticed by the said complainant for hearing on pleadings and proofs at said June term; that deponent has also pending a suit brought by said complainant for alleged infringement of a trade mark, which has been noticed by said complainant for trial at a term of the State supreme court appointed for June 16th instant; that in all of said causes deponent expects the said defendant to be in readiness for trial and final hearing, except that in the present cause, as deponent is advised by his said counsel, in view of the character and complication of the issues therein and the large amount of labor necessary on the part of such counsel in order to properly present and argue the case, and the other and earlier causes between the parties to be heard at the June term, if no further evidence were required to be taken, it would — impracticable to have such cause brought to a final hearing at such term. And deponent further says that he is informed by said defendant's said counsel that when attending before the examiner of the complainant on said 30th day of May last the said counsel informed said complainant's solicitor that before the evidence in said cause could be closed the said defendant would 28 require a further examination to be had of its mechanical expert, Edward Wilhelm, in reply to new matter contained in the closing deposition of Mr. Osgood.

CHARLES B. MATTHEWS.

Subscribed and sworn to before me this 9th day of June, 1884.

WM. C. FITCH,
Notary Public, Erie Co.

(Indorsed:) United States circuit court, northern district of New York. In equity. No. 3748. The Vacuum Oil Company, complainant, *vs.* Buffalo Lubricating Oil Company, Limited, defendant. Notice of motion and affidavit. Corlett & Hatch, def't's solicitors, Buffalo, N. Y. I admit service on me of a copy of the within papers June 9th, 1884. T. G. Outerbridge, compl't's sol'r. Filed Jun. 17, 1884. Wm. S. Doolittle, clerk.

29 *Order.*

At a stated term of the circuit court of the United States of America for the northern district of New York, in the second circuit, held at the court-house, in the village of Canandaigua, on the 17th day of June, A. D. 1884.

Present: The Honorable Alfred C. Coxe, judge.

THE VACUUM OIL COMPANY, Complainant,
vs.
BUFFALO LUBRICATING OIL COMPANY, Limited, Defendant.
No. 3748.

On reading and filing the affidavit of Charles B. Matthews, after hearing Mr. James A. Allen, of counsel for the defendant, in support of motion to strike the above cause from the calendar of the present term of court and to extend the time of the defendant for taking proofs in said cause, and Mr. George B. Selden in opposition thereto, it is hereby ordered that the said cause be, and the same is hereby, stricken from the calendar of the term of court now sitting, and it is also further ordered that on payment to the complainant's solicitor of the sum of twenty dollars the time of the defendant for taking proofs in the said cause be, and the same is hereby, enlarged six weeks from the day of the date of this order, and that the said complainant may also have three weeks thereafter, within which 30 said three weeks the said complainant may take testimony in the said cause in rebuttal to new evidence hereafter produced on the part of said defendant.

ALFRED C. COXE.

(Indorsed:) Equity No. 3748. U. S. circuit court, northern district of New York. Vacuum Oil Co. *vs.* Buf. Lub. Oil Co. Order. Filed Jun. 17, 1884. Wm. S. Doolittle, clerk.

31 *Order Dismissing Bill.*

At a stated term of the circuit court of the United States of America for the northern district of New York, in the second circuit, held at the court-rooms in Albany, on the twenty-third day of January, A. D. 1885.

Present: The Honorable William J. Wallace, circuit judge.

THE VACUUM OIL COMPANY, Complainant,
vs.
BUFFALO LUBRICATING OIL COMPANY, Limited, Defendant.
} No. 3748.

This cause came on to be heard at this term and was argued by Mr. George B. Selden on the part of the complainant and by Mr. James A. Allen on the part of the defendant, and thereupon, upon consideration thereof, it was ordered, adjudged, and decreed as follows, viz:

That the bill of complaint of the said complainant be, and the same is hereby, dismissed with costs to the defendant, the letters patent named in said complaint having expired and the said bill of complaint not stating a cause of action for an account.

WM. J. WALLACE.

(Indorsed:) In equity. No. 3748. U. S. circuit court, northern district of New York. The Vacuum Oil Co. *vs.* Buf. Lub. Oil Co. Order dismissing bill, &c. Filed Jan. 23, 1885. Wm. S. Doolittle, clerk.

32 *Petition for Rehearing.*

United States Circuit Court, Northern District of New York. In Equity.

THE VACUUM OIL COMPANY
vs.
BUFFALO LUBRICATING OIL COMPANY, Limited.
} No. 3748.

To the honorable the judges of the circuit court of the United States, in the second circuit, in and for the northern district of New York:

The petition of the Vacuum Oil Company, the above-named complainant, respectfully showeth:

That your petitioner finds itself much aggrieved by a decretal order made by Hon. William J. Wallace, one of the judges of this court, on the third Tuesday in January, 1885, and filed with the clerk of the court on the 23rd day of January, 1885, whereby the bill of your petitioner was dismissed on the ground that the patent having expired the bill did not state a cause of action for an account.

Your petitioner, by its solicitor, further says that the bill was filed more than two years before the expiration of the patent; that at the June term of this court, in 1884, before the expiration of said patent, the cause was ready for final hearing, the proofs having been duly closed, and was duly noticed by the complainant for final hearing; that at said June term the defendant moved to open the case for
the purpose of taking further expert testimony; that said mo-
33 tion was granted by Hon. Alfred C. Coxe, who presided at
said term; that thereupon the case was reopened and testimony taken until the proofs were finally closed on or about the 22nd day of December, 1884; that said patent expired Sept. 3, 1884.

Your petitioner, by its solicitor, further says that the omission to move to amend the bill by inserting the allegations of damage and profits, thereby making it state a cause of action for account after expiration of the patent, was entirely through the inadvertence of your petitioner's solicitor and counsel; that that technical requirement was not brought to their attention, and that they entirely overlooked it, devoting their time and attention to the consideration of the merits of the cause.

That your petitioner has exhibited its bill in this honorable court against the said defendant, The Buffalo Lubricating Oil Company, Limited, which has put in its answer, and that your petitioner is advised to amend its said bill.

Your petitioner therefore humbly prays that it may be at liberty to amend its said bill as follows:

After the sixth paragraph of the said bill insert the following amendment:

"And your orator further avers that the defendant has made and used, or caused to be made and used, the said patented improvement, and that it has derived large profits therefrom, but to what amount your orator is ignorant and cannot set forth, and that your orator has been deprived of large royalties by reason of the aforesaid
infringement of the said defendant, and has incurred large
34 damages by the said infringement of the said defendant.

Wherefore your petitioner, by its solicitor, prays that your honors will be pleased to vouchsafe a rehearing of this cause and an amendment to said bill as above prayed, and that in the meantime and until the hearing of said application an order may issue staying the enrollment of the decree, your petitioner submitting to pay such costs as the court shall award in case its complaint shall be found groundless.

And your petitioner will ever pray, &c.

Dated Rochester, January 29, 1885.

THE VACUUM OIL COMPANY,
By THOMAS G. OUTERBRIDGE,
Solicitor.

We certify that we have examined the case referred to in the foregoing petition, and are of opinion that the case is a proper one for rehearing for the reasons specified in said petition.

GEO. B. SELDEN, *Def't's Counsel.*
THOMAS G. OUTERBRIDGE,
Solicitor and of Counsel.

UNITED STATES OF AMERICA.

STATE OF NEW YORK,
Northern District of New York, County of Monroe, } *ss:*

Thomas G. Outerbridge, being duly sworn, says that he is the solicitor in this cause for the complainant named in the foregoing petition; that he has read the foregoing petition and knows
35 the contents thereof, and that the same is true to his own
knowledge, except as to the matter therein stated to be alleged on information and belief, and as to those matters he believes it to be true.

T. G. OUTERBRIDGE.

Subscribed and sworn to before me this 29th day of January, 1885
[L. S.] EDWARD W. MAURER,
Notary Public.

NORTHERN DISTRICT OF NEW YORK,
Monroe County, } *ss:*

United States Circuit Court, Northern District of New York. In Equity.

VACUUM OIL COMPANY
against
BUFFALO LUBRICATING CO., Limited. } No. 3748.

George B. Selden, being duly sworn, doth depose and say the omission from the bill of complaint herein of an allegation charging the defendant with damages and profits was entirely inadvertent. I find on examination that a printed form was used in the preparation of the bill of complaint herein, which form has, to my knowledge, passed unquestioned through many previous suits. During the entire progress of the case my attention had been devoted to the merits, and I had no intimation at any time prior to the hear-
36 ing that any question would be raised with reference to the
pleadings by the defendant herein.

GEO. B. SELDEN.

Sworn and subscribed before me this 29th day of January, 1885.
[L. S.] JACOB SPAHN,
Notary Public in and for Monroe County, N. Y.

(Indorsed:) U. S. circuit court, N. dist. of New York. 3748. The Vacuum Oil Company *vs.* Buffalo Lubricating Oil Company, Limited. Petition for rehearing. T. G. Outerbridge, sol'r for compl't, Rochester, N. Y. Filed Jan. 30, 1885. Wm. S. Doolittle, clerk.

37 *Order to Shew Cause.*

United States Circuit Court, Northern District of New York. In Equity.

VACUUM OIL CO.
vs.
BUFFALO LUBRICATING OIL CO., Limited. } No. 3748.

On filing petition for rehearing and accompanying affidavits herein, it is hereby ordered that the defendant show cause, at the next term of this court at Utica, on the 3d Tuesday of March, 1885, why the prayer of the said petition for amendment of the bill and for rehearing should not be granted, and it is hereby further ordered that the enrollment of decree herein be, and is hereby, stayed until the hearing and decision of the said application.

Dated Jan. 30, 1885.

WM. J. WALLACE.

(Indorsed:) U. S. c't c't, N. dist. N. Y. In equity. No. 3748. Vacuum Oil Co. *vs.* Buffalo Lubricating Oil Co., Limited. Order to show cause. Filed Jan. 31, 1885. Wm. S. Doolittle, clerk.

38 *Affidavits Opposing Rehearing.*

STATE OF NEW YORK,
Northern District of New York, County of Erie, } *ss:*

United States Circuit Court, Northern District of New York. In Equity.

THE VACUUM OIL COMPANY, Complainant,
vs.
BUFFALO LUBRICATING OIL COMPANY, Limited, Defendant. } No. 3748.

Charles B. Matthews, being duly sworn, deposes and says that he is the president of the corporation defendant in the above-entitled cause, and resides in the city of Buffalo, in said county; that as such president he has had the charge of the proceedings which have been had and taken in the said cause on the part of the defendant; that the answer of the defendant, verified by this deponent, was filed on or about September 29, 1882, setting up the invalidity of the complainant's letters patent, on the ground that Hiram B. Everest, named in the bill of complaint, was not the original and first inventor of the alleged invention or improvement described and claimed in the said letters patent, but that the same, prior to the supposed invention thereof, had been patented and described in various letters patent granted by the Governments of the United States and of Great Britain, which were particularly specified in the said
answer; that the second claim of the complainant's pat-
39 ent was plainly anticipated by the following prior letters
patent of the United States, which were specified in the said

answer: Letters patent to M. P. Ewing, No. 58020, which are marked Defendant's Exhibit P and set forth in defendant's record at page 100; letters patent to A. D. Higham, No. 54157, marked Defendant's Exhibit B and set forth in defendant's record at page 59; letters patent to Tait and Avis, No. 53359, marked Defendant's Exhibit C, set forth in defendant's record at pages 61–62; letters patent to O. Lugo, No. 58113, marked Defendant's Exhibit O and set forth in defendant's record at page 99, and that said letters patent or specifications and drawings thereof were produced in evidence and proved in the said caused on the 10th day of July, 1883, together with letters patent to P. H. Vanderweyde, No. 58005, also anticipatory of the same claim of said complainant's patent, which are marked Defendant's Exhibit I and set forth in defendant's record at page 69.

Deponent further says that the fifth claim of the said complainant's letters patent was plainly anticipated by letters patent to Herbert W. C. Tweddle, reissue No. 2404, marked Defendant's Exhibit H and set forth in said answer and contained in defendant's record at pages 66–68.

Deponent further says that prior to the 10th day of July, 1883, an amendment was made of the defendant's answer by stipulation, which is contained in complainant's printed record at pages 12 and 13, in and by which the following patents were pleaded as matter anticipatory of the said complainant's letters patent and the
40 invention therein described and claimed: Letters patent of the United States to P. H. Vanderweyde, No. 58005, marked Defendant's Exhibit I and set forth in defendant's record at pages 69–70, and British letters patent to George Hamilton, No. 149, marked Defendant's Exhibit S and set forth in defendant's record at pages 108–115, and that such letters patent or the specifications and drawings thereof were produced in evidence and proved on the 10th day of July, 1883, pursuant to such amendment of such answer so made by stipulation, and that such last-named patents were plainly anticipatory of the matter of the fifth claim of said complainant's letters patent.

And deponent further says that the said letters patent to Lugo, Defendant's Exhibit O, above mentioned, and to Vanderweyde, Defendant's Exhibit I, as well as letters patent to N. Milochau, No. 53167, named in said answer, were plainly anticipatory of the twelfth claim of the said camplainant's letters patent.

And deponent further says that other claims of the said complainant's letters patent than those above specified were shown to be void by the prior patents specified and set forth in the said answer and in the said amendment thereof, made prior to July 10th, 1883, and which were produced in evidence and proved in the said cause on the said 10th day of July, 1883.

Deponent further says that in the opening proofs in the cause the defendant was charged with the infringement of ten of the fourteen claims of the complainant's patent, including said second,
41 fifth, and twelfth claims by said complainant's expert.

Deponent further says that the invalidity of the said second, fifth, twelfth, and other claims of the complainant's letters patent was pointed out and explained by expert testimony taken on the part of the defendant in said cause on and prior to the 15th day of August, A. D. 1883, as fully appears by the defendant's printed record in said cause, between pages 17 and 38, and that when the complainant's expert was recalled in rebuttal no attempt was made by him, after the introduction of the letters patent above specified, to sustain the validity of said second, fifth, and twelfth claims of said complainant's patent.

Deponent further says that the letters patent of the said complainant expired on the 3rd day of September, 1884, and that, as shown by the complainant's printed record in this cause on page 79, at folios 388–'9, on the 22nd day of December, A. D. 1884, at the closing of all the proofs in said cause, the defendant's counsel requested the complainant's counsel to designate on which of the claims in complainant's patent he would insist at the hearing that the complainant was entitled to recover, and that such request was refused by the complainant's counsel.

Deponent further says that on the 23rd day of January, A. D. 1885, it was stated to the court by the complainant's counsel in this cause, Mr. George B. Selden, that no disclaimer had been filed in the Patent Office in respect to the complainant's letters patent.

42 Deponent further says that he insists, as matter of law and as matter of fact, that the complainant in this cause has unreasonably neglected or delayed to enter a disclaimer of void claims of the said letters patent.

Deponent further says that the counsel for the defendant in this cause was in attendance on the January term of this court during four days for the sole purpose of bringing on the hearing of this cause, and that deponent, as president of said defendant, was in attendance three days prior to such hearing, and that the cost and expenses of attendance on the part of the defendant at said January term exceeded the sum of two hundred dollars, and that the defendant's bill of costs in said cause has been taxed and adjusted, as deponent is informed and believes, by the clerk of said court at the sum of $350.97.

CHARLES B. MATTHEWS.

Subscribed and sworn to before me this 26th day of February, A. D. 1885.

[L. S.]

CHAS. B. HILL,
Notary Public.

43 STATE OF NEW YORK,
Northern District of New York, County of Erie, } *ss:*

United States Circuit Court, Northern District of New York. In Equity.

THE VACUUM OIL COMPANY, Complainant,
vs.
BUFFALO LUBRICATING OIL COMPANY (Limited), Defendant. } No. 3748.

James A. Allen, being duly sworn, deposes and says that he resides in the city of Buffalo, in said county, and is of counsel for the defendant in the above-entitled cause; that in the afternoon of Monday, January 19, 1885, deponent took the train from Rochester for Albany to attend the term of this court to be held on the following morning in company with George B. Selden, Esq., the complainant's counsel, and T. G. Outerbridge, its solicitor; that while on the said train the said George B. Selden came to deponent's seat and voluntarily stated to deponent in substance that he could now state to deponent on what claims of complainant's patent he would ask a recovery at the hearing; that such claims would be the third, fourth, seventh, and eighth, and no others; that he could not have informed deponent sooner, as he did not know himself; had not before
44 sufficiently examined the matter to say, and that immediately following such interview the said Thomas G. Outerbridge also came to deponent's seat, and, continuing the same subject and excusing the delay in stating their position, said in substance that it had not been an easy matter on their side of the case to bring their minds to the giving up of so many of the claims of their patent as they were going to do.

JAMES A. ALLEN.

Subscribed & sworn to before me this 4th day of March, 1885.

CHAS. B. HILL,
Notary Public.

(Indorsed:) United States circuit court, northern district of New York. In equity. No. 3748. The Vacuum Oil Company, complainant, *v.* Buffalo Lubricating Oil Company, Limited, defendant. Affidavits in opposition to mo. for rehearing, &c. Corlett & Hatch, def't's solicitors, Buffalo, N. Y. Filed March 18, 1885. W. S. Doolittle, clerk.

45 *Order Granting Rehearing & Amendment to Bill.*

At an adjourned term of the circuit court of the United States of America for the northern district of New York, in the second circuit, held at Utica on the 17th day of March, A. D. 1885.

Present: The Honorable William J. Wallace, judge.

THE VACUUM OIL COMPANY
against
BUFFALO LUBRICATING OIL COMPANY, Limited. } In Equity. No. 3748.

On the petition for rehearing and amendment filed herein and the affidavits read and filed on the part of the defendant, and after hearing George B. Selden, Esqr., counsel for the complainant, for the motion, and James A. Allen, Esqr., counsel for the defendant, opposed, it is ordered that the cause be reheard forthwith and that the complainant's bill of complaint be amended by inserting after the sixth paragraph of the bill the following: "And your orator avers that the defendant has made and used, or caused to be made and used, the said patented improvement, and that it has derived large profits therefrom, but to what extent your orator is ignorant and cannot set forth, and that your orator has been deprived of large royalties by reason of the aforesaid infringement of the said defendant and has incurred large damages by the said infringement of the said defendant." 46

WM. J. WALLACE.

(Indorsed:) Equity No. 3748. U. S. circuit court, northern district of New York. Vacuum Oil Co. *vs.* Buffalo Lubricating Oil Co. Order. Filed Mar. 17, 1885. Wm. S. Doolittle, clerk.

47 *Amendment to Bill.*

United States Circuit Court, Northern District of New York. In Equity.

THE VACUUM OIL COMPANY
vs.
BUFFALO LUBRICATING OIL COMPANY, Limited. } No. 3748.

Amendment allowed to complainant's bill at an adjourned term of this court, March 17, 1885.

After the sixth paragraph of the said bill insert the following amendment:

"And your orator further avers that the defendant has made and used, or caused to be made and used, the said patented improvement, and that it has derived large profits therefrom, but to what extent your orator is ignorant and cannot set forth, and that your orator has been deprived of large royalties by reason of the aforesaid infringement of the said defendant and has incurred large damages by the said infringement of the said defendant."

To the clerk of the circuit court for the northern district of New York:

Please file the foregoing amendment to bill.

Yours, &c., T. G. OUTERBRIDGE,
Solicitor for Complainant, Rochester, N. Y.

Filed Mar. 19, 1885.

W. S. DOOLITTLE, *Clerk.*

48 *Order Dismissing Bill on Rehearing.*

At an adjourned term of the circuit court of the United States of America for the northern district of New York, in the second circuit, held at the United States court-rooms in Utica on the 17 day of March, A. D. 1885.

Present: The Honorable William J. Wallace, circuit judge.

THE VACUUM OIL COMPANY, Complainant, *vs.* BUFFALO LUBRICATING OIL COMPANY, Limited, Defendant.	In Equity. No. 3748.

This cause came on to be heard at this term, and was argued by Mr. George B. Selden, of counsel for the complainant, and by Mr. James A. Allen, of counsel for the defendant; and thereupon, upon consideration thereof, it was ordered, adjudged, and decreed as follows, viz:

That the letters patent dated September 3, 1867, No. 68426, granted to the Vacuum Oil Company, assignee of Hiram B. Everest, for an improvement in apparatus for distilling petroleum, for alleged infringement of which this suit is brought (it being conceded by the complainant that no disclaimer has been filed), are null and void.

And it is hereby further ordered, adjudged, and decreed
49 that the complainant's bill of complaint in this cause be, and
the same is hereby, dismissed on the merits, and that the said defendant recover of the said complainant the defendant's costs in this cause, to be taxed.

WM. J. WALLACE.

(Indorsed:) Equity No. 3748. U. S. circuit court, northern district of New York. Vacuum Oil Co. *vs.* Buffalo Lubricating Co. Decree. Filed Mar. 17, 1885. W. S. Doolittle, clerk.

And the costs having been taxed by the clerk in the sum of $370.12, wherefore let defendant, Buffalo Lubricating Oil Company, Limited, recover of complainant, The Vacuum Oil Company, the sum of three hundred seventy $\frac{12}{100}$ dollars, its costs herein so as aforesaid taxed, and have execution therefor.

Whereupon the said pleadings, process, orders, and final decree, together with other papers in said cause, are duly annexed hereto, and this decree is duly signed and enrolled, pursuant to the rules and practice of the court, this 30th day of March, A. D. 1885, at 12 o'clock and 30 minutes in the afternoon.

W. S. DOOLITTLE, *Clerk.*

(Indorsed:) Equity No. 3748. United States circuit court, northern district of New York. The Vacuum Oil Company *versus* Buffalo Lubricating Oil Company, Limited. Enrolled decree. Corlett & Hatch, deft's solicitors. Damages, $——; costs, 370.12; total, $370.12. Filed the 30th day of March, 1885, 12.30 o'clock p. m. W. S. Doolittle, clerk.

50 United States Circuit C't, Northern Dist. of New York. In Equity.

THE VACUUM OIL COMPANY
vs.
BUFFALO LUBRICATING OIL COMPANY, Limited. } No. 3748.

It is hereby stipulated that Adelbert Cronise, notary public, of Rochester, N. Y., be appointed a special examiner to take such evidence and proofs in the above-entitled suit as may be adduced by the complainant herein.

Dated Feb'y 9, 1883.

JAMES A. ALLEN,
Of Counsel for Defendant.
T. G. OUTERBRIDGE,
Compl't's Solicitor.

(Indorsed:) No. 3748. U. S. c't c't, N. dist. of N. Y. The Vacuum Oil Company *vs.* Buffalo Lubricating Oil Company, Limited. Draft stipulated for special examiner. T. G. Outerbridge, compl't's solicitor, Rochester, N. Y.

51 *Complainant's Proofs.*

United States Circuit Court, Northern District of New York. Equity.

THE VACUUM OIL COMPANY
against
BUFFALO LUBRICATING OIL COMPANY. } 3748.

Testimony taken and proceedings had before me, as special examiner on behalf of complainant, pursuant to the annexed stipulation and notice and the order entered thereon.

WEDNESDAY, *February* 14, 1883—10 a. m.

Complainant appeared by T. G. Outerbridge, solicitor, and George B. Selden, of counsel; defendant appeared by Mr. James A. Allen, of counsel.

Complainant offers in evidence original letters patent No. 68426, issued to the Vacuum Oil Company of Rochester, N. Y., September 3, 1867, for an improvement in apparatus for distilling petroleum.

52 Same received in evidence and marked "Complainant's Exhibit Everest Vacuum Apparatus Patent."

Adjourned to 2 p. m.

2 P. M.

Same appearance.

By consent of counsel proceedings adjourned to Wednesday, February 21st, at 10.30 a. m., at 24 Power's buildings, subject to the option of defendant's counsel to appear Monday, February 19th, at 10.30 a. m., in case he shall notify complainant's counsel of his desire to do so on or before Saturday, February 17.

ADELBERT CRONISE,
Special Examiner.

MONDAY, *February* 19, 1883—10 a. m.

T. G. Outerbridge, for complainant; James A. Allen, for defendant.

By consent held open till 2 p. m.

2 P. M.

Same appearances.

By consent adjourned to Tuesday, February 20, 1883, at 10 a. m., subject to further adjournment by telegraph.

ADELBERT CRONISE,
Special Examiner.

TUESDAY, *February* 20*th*, 1883—10 a. m.

T. G. Outerbridge appeared for the complainant.

At request of James A. Allen, Esq., presented by telegraph, Mr. Outerbridge consenting, the hearing was adjourned to Monday, February 26th, 1883, 10 a. m.

ADELBERT CRONISE.
Special Examiner.

53 MONDAY, *February* 26*th*, 1883—10 a. m.

Same appearances.

WALTER GROVES, being duly sworn, testified as follows:

1. What is your name, age, residence, and occupation?

A. Walter Groves; twenty-two; Buffalo; stillman.

2. Have you ever been in the employ of the Buffalo Lubricating Oil Co., Limited?

A. I have.

3. How long were you in the employ of said company?

A. A little over a year.

4. When did you commence working for said company, and when did you leave them?

A. In the fall of 1881. I left them in the fall of 1882.

—. How many stills had the said company while you were employed there?

A. Three.

6. What kind of stills were these?

A. Two were common lubricating stills and one was a vacuum.

7. What was the vacuum still used for?

A. For making lubricating oils.

8. State as near as you can the shape and dimensions of this vacuum still.

A. The shape was just the same as a boiler—a steam boiler; it was about ten feet long and about three and a half feet in diameter.

9. How was the vacuum still supported in place?

A. By brick-work.

54 10. Was there a condenser employed in connection with the vacuum still?

A. There was.

11. How was the vacuum still connected with the condenser?

A. By pipes.

12. Can you state how many pipes there were?

A. I think there were about five.

13. Was there an exhaust pump used in connection with this vacuum still?

A. There was.

14. Was there a condensing coil connected with the condenser?

A. There was.

15. State how the exhaust or vacuum pump was connected with the apparatus which you have described and how it acted.

A. It was connected from the pump to a pipe right outside of the condenser, so that there would be a vacuum in all parts of the still. This would draw all the vapor and odor off and leave the oil remaining in the still.

16. What kind of steam did the Buffalo company use in the vacuum still?

A. Superheated.

17. Describe the apparatus by which this steam was produced, superheated, and introduced into the vacuum still?

A. The raw steam entered into a casting which allowed it to go through a coil of pipe, and it came over into another casting and then into a 2-inch pipe which led into the still.

55 18. Where were these castings and this coil of pipe placed?

A. In the superheater or superheating furnace.

19. Where was the superheating furnace located, with reference to the steam boiler and its furnace?

A. Right by the side of the steam boiler.

20. Describe the course of the smoke and products of combustion from the fire in the superheating furnace.

A. It went through a hole in the back part of the superheater, through the flues of the boiler, and up the stack.

21. How many pipes were there in the superheater and what were their size?

A. There were five coils or series of one-inch pipe placed one above the other.

22. How were these pipes attached to the castings, which you mentioned, through which the steam passed?

A. They were screwed in.

23. What was the size and shape of these castings?

A. They were long and round, with a two-inch opening at the end.

24. Where were the one-inch pipes of the superheater screwed into these hollow castings?

A. In the bottom or under side of them.

25. Describe the apparatus by which the superheated steam was introduced into the vacuum still.

A. It entered a coil that was in the still—about inch pipe, as near as I can recollect; there was one pipe above the other, and then they lay side by side in the still. The steam circulated through this coil and was let out again at the head of the still to keep up a circulation; then there was two small pipes that would let the super-
56 heated steam go right into the oil; these last two pipes had holes in them.

26. Describe the apparatus used by the Buffalo company to determine the height of the oil in the vacuum still.

A. It was a glass gauge attached to the still, so that the oil would rise in the glass as it rose in the still.

27. Did you see this whole apparatus, consisting of a steam boiler, steam superheating furnace and pipes, vacuum still and its attachments, in practical use prior to the first of June, 1882?

A. I did.

28. For what purpose was this apparatus which you have described employed?

A. For making lubricating oil from petroleum.

29. At what kind of work were you employed while you were in defendant's refinery?

A. Running stills.

30. What apparatus was used by the defendants to collect the distilled oil from the condenser and condensing coils?

A. It was a pump.

31. Anything else?

A. There were pipes that it run into and receivers.

32. How many receivers were there?

A. Two.

33. Where were these receivers located with reference to the condensing coil?

A. They were right under the condenser.

34. So that the distilled oil could run from the condenser and condensing coil into the receiver?

57 A. Yes, sir.

35. Have you worked in any other refinery since leaving defendant's employment?

A. Yes, sir; in the Phœnix oil refinery in Buffalo.

36. In what capacity were you employed there?

A. Running stills.

37. Have you seen the vacuum still and connected apparatus used by the Vacuum Oil Company at their works in Rochester, N. Y.?

Objected to as irrelevant and immaterial.

A. I have.

38. State whether or not the vacuum still and apparatus used by the Buffalo Lubricating Oil Company while you were in their employ is substantially similar to the still and apparatus which you saw at the works of the Vacuum Oil Company in Rochester?

Objected to as grossly leading and an improper method of arriving at a description of the apparatus used in defendant's works.
Question waived.

39. Is there any difference between the still and apparatus used by the defendants the Buffalo Lubricating Oil Company, Limited, while you were in their employ, and the vacuum still and apparatus which you saw at the works of the Vacuum Oil Company in Rochester, N. Y.? And, if so, state what it is.

The second objection to the last preceding question is renewed; also the evidence is immaterial and incompetent.

A. I can see no difference, only the works at Rochester are much larger.

58 40. Have you made or caused to be made a model representing the vacuum still used by defendants herein? And, if so, please produce the same.

A. I have. (Witness produces the model.)

41. Does this model now produced by you substantially represent the defendant's vacuum still?

Objected to as leading.

A. It does, as near as I can recollect it.

42. Does this model represent the steam boiler and superheating furnace used by the defendant?

A. It does.

43. And does it also represent the vacuum still, condenser, goosenecks, condensing coil, receiver, vacuum pump, and connecting piping used by the defendants while you were in their employ?

A. It does, as nearly as I can recollect.

44. Of what material is the water tank in which the condenser and condensing coils are located in the defendant's works?

A. Wood.

45. And this tank in the model is made of sheet brass?

A. Yes, sir.

46. I notice two holes or openings in one of the ends of the vacuum still in the model; what are these openings for in the working apparatus used by defendants?

A. One is a man-hole, the other is an eye-hole.

47. They are left open in the model in order that by removing a loose head in the opposite end of the still a person may look through the still?

A. Yes, sir.

59 48. State, as near as you can, the time when you first saw the vacuum still and apparatus, such as you have described, in practical operation at the defendant's works.

A. In the latter part of October, in 1881.

49. And you saw the same vacuum still and apparatus in practical use from time to time thereafter until you left the works?

A. I did.

50. State whether the vacuum still and apparatus which you saw at the vacuum works in Rochester was a single or double still and apparatus.

Objected to as immaterial.

A. A double. They have both double and single. I saw both.

51. Which apparatus, the single or double, did you refer to in comparing the Buffalo company's vacuum still with the Vacuum Oil Company's vacuum still?

A. The single.

Model offered in evidence, received, and marked Complainant's Exhibit Model Defendant's Vacuum Still.

Adjourned to 2 p. m.

MONDAY, *February* 26—2 p. m.

Same appearance.

Recross-examination by Mr. ALLEN:

52 X. You say you are a stillman?

A. Yes, sir.

53 X. In whose employ?

A. I have been working for the Phœnix.

60 54 X. In whose employ are you as a stillman?

A. I am in no one's employ at present.

55 X. What is your present employment, and for whom are you employed?

A. I am not employed by any one at present, and am not doing anything at present, only as a witness in this case.

56 X. For how long a time has your sole employment been as a witness in this case?

Objected to as immaterial.

A. I cannot exactly tell that.

57 X. Tell me as nearly as you can.

A. A couple of weeks, anyway, I have been at this model.

58 X. Who procured your services?

Objected to as immaterial.

A. Mr. Curtin; I don't know his given name.

59 X. Where were you when Mr. Curtin found you?

A. Working for the Phœnix.

60 X. At what date did you leave the Phœnix?

A. I can't give the date for that.

61 X. Give it as nearly as you are able.

A. As near as I can come at it, when I left them and came to work at these things.

62 X. I want to know if you can answer directly when you left the Phœnix?

A. I cannot now.

63 X. The Phœnix is located in Buffalo?

A. Yes, sir.

61 64 X. You are now located in Rochester?

A. For the present.

65 —. Under what arrangement did you change your employment from the Phœnix and come here?

A. I don't know as any special arrangement at all.

66 X. Previous to doing it did you receive money?

A. No, sir.

67 —. Have you received money for doing it?

A. I have not.

68 X. Has any one agreed to pay you money for doing it?

A. They have not paid me for leaving the Phœnix; I have not received any money.

69 X. I understand, then, that what you have been doing here has been without compensation and without expectation of compensation?

A. I expect to get pay for my time; my time is my money.

70 —. Has anything been paid you on that account?

A. No, sir.

All the preceding cross-examination of this witness is objected to as immaterial.

71 X. What arrangement is there as to your rate of compensation?

A. I was to have more than I was getting for the time I am here.

72 X. And for how long a time are you to be under employment here?

A. Till the trial is over, I suppose.

62 73 X. Have you any engagement in regard to doing work in the complainant's works?

A. No, sir.

74 —. Did you leave the Phœnix without giving them any notice?

A. No, sir; I asked for my time and they gave it to me. I should think that was notice enough. That is the way I did with the Buffalo works.

75 X. How much previous notice did you give to the Phœnix?

A. I did not give any previous notice, nor did I to the Buffalo works.

76 —. What wages did you get at the Phœnix?

A. I got twenty cents an hour—two dollars a day.

77 X. After you quit the Phœnix and engaged to come here did you make your boast in Buffalo that you now had got plenty of money?

A. Not that I know of.

78 X. What was your occupation in Buffalo before you went to work for the defendant?

A. I was not at work in Buffalo before I went to work for defendant.

79 X. How long was you in Buffalo before you went to work for defendant?

Both law questions objected to as immaterial.

A. I can't exactly tell that, either.

80 X. I want to know, to the best of what you can remember?

A. You will be apt to want.

63 81 X. Were you employed as stillman of the vacuum still in the defendant's works?

A. No, sir.

82 X. Your main work there was to shovel coal, was it not?

A. I think they had a man by the name of Jo. Conners to do that. I run stills when I was there.

83 X. What two stills?

A. Their two large stills.

84 X. Who else ran them?

A. Dick Porter did for awhile, I guess, while I was there.

85 X. Who else while you — there?

A. No one that I know of.

86 X. Was that your first work in an oil refinery?

A. That was the first.

87 X. Previous to that had you smuggled goods between the United States and Canada?

Objected to as incompetent and immaterial.

A. I took over some samples of vacuum oil for Matthews. The custom-house officers looked at it, but said it was all right.

88 X. Have you ever smuggled matches from Canada?

Same objection.

A. I brought a box of matches over once and Matthews bought them of me—Frank Beardslee, I should say.

89 X. Have you ever smuggled tobacco from Canada?

Same objection.

64 A. I never smuggled anything from Canada at all.

90 X. Have you ever been in jail for smuggling?

Same objection.

A. I am here; it don't look as if I had been in lately, anyhow.

Cross-examination closed.

Redirect by Mr. SELDEN:

91. Who was Frank Beardslee?

A. Mr. Matthews' brother-in-law.

92. Was he employed in the defendant's works?

A. Yes, sir.

93. While you were employed at the defendant's works was it their custom to keep their premises locked up so as to entirely exclude visitors?

A. It was.

94. Was the vacuum still and apparatus in the defendant's works enclosed within a building which was kept locked and to which only a few of the employees had access?

A. Yes, sir.

95. Were you one of the employees who had access to the vacuum still?

A. Yes, sir.

96. What daily wages did Mr. Curtin agree to give while you were at work on this job, preparing the model, and testifying in this case?

A. He told me that I should have what I thought was a good fair and square day's wages.

97. Have you been sick during the greater part of last week?

65 A. I have.

98. So that you were unable to attend to this case.

A. Yes, sir.

99. Did you consult a doctor about your sickness?

A. I did.

100. Do you know of any party except yourself who knows about the construction of the defendant's vacuum still and who is not now in the employ of defendant?

Objected to as not a fact pertinent to be proved on direct or re-direct examination.

A. I do.

101. Who is it?

A. Mr. Reily.

102. Anybody else?

A. No, sir.

Examination of witness —.

Mr. Selden objected to all the cross-examination as immaterial.

WALTER GROVES.

Taken, read, subscribed, and sworn to before me Feb. 26, 1883.

ADELBERT CRONISE,
Notary Public and Sp. Ex.

RUFUS F. OSGOOD, being duly sworn for complainant and examined by counsel, testified as follows:

1. State in full your name, age, residence, and occupation.

A. Rufus F. Osgood; age, 51 years; Rochester, N. Y., 240 North St. Paul street; solicitor of patents.

66 2. What experience have you had as an expert witness in litigations regarding patents before the United States courts?

A. I have frequently given testimony in such cases for the past fifteen or twenty years.

3. Have you read Complainant's Exhibit Everest Vacuum Apparatus Patent, and do you understand the invention therein described and claimed?

A. I have read the patent and understand the invention described and claimed.

4. Have you read from the record in this case the testimony of complainant's witness, Walter Groves?

A. I have.

5. Have you examined the model introduced by complainants and marked Complainant's Exhibit Model Defendant's Vacuum Still?

A. I have.

6. Do you understand the construction and operation of the vacuum still used by the defendants at their works in Buffalo, N. Y., as described by said witness Groves and as illustrated in the said model?

A. I do understand the construction and operation of the still.

7. Please compare the defendant's vacuum still and apparatus with the vacuum still and apparatus described in the said Everest patent; state their resemblance and difference, if any, and state, also, whether, in your opinion or not, the defendant's said vacuum still and apparatus embodies or contains any of the invention described and claimed in said patent, and state your reason for any opinion you may express.

Adjourned to 8 p. m.

67 8 P. M.

Same appearance.

Defendant's counsel objects to the last question on the ground that witness has no knowledge of defendant's works and has not the means of making the comparison asked for.

Complainant's counsel states to witness that in giving his answer to the last question he will have reference to defendant's vacuum still and apparatus as described by the witness Groves and as illustrated by Complainant's Exhibit Model Defendant's Vacuum Still.

Defendant's counsel further objected that the model referred to is not proved, and that it is incompetent for the witness to put a construction as a witness as to what is proved by the witness Groves.

A. I find from the testimony given by the witness Groves, and as shown in the model defendant's vacuum still, that the defendants use a vacuum still or retort in the shape of a boiler or elongated vessel lying horizontally, in which the oil is to be placed for distilling. A series of goose-necks extend from the top of the still and open at the opposite end into a condenser, which lies in a tank of water. These goose-necks are arranged at intervals apart so as to convey the vapor from all parts of the still in as direct line as possible to the condenser. Beneath the condenser is a coil of condensing pipe which opens from the condenser resting in the water tank, thence extends outward through the water tank and connects with branch pipes which open into receiving vessels underneath the water tank and so low that the condensed oil will flow into the receiver by gravity.

A boiler is used for generating steam, which is taken off at the top
by a pipe connected with the steam room. Alongside of the boiler
is a superheating furnace, whose interior space connects with
68 the boiler space by a port or opening at the end furtherest
from the smoke pipe. In this port is a damper for controlling
the draft from the superheating furnace. The draft from the furnace passes through the port into the furnace space of the boiler, passes through the flues of the boiler, and escapes into the smoke pipe.

In the superheating furnace are arranged a series of coils of steam pipe, which rest upon supports, their length standing vertically. These pipes at one end connect with the pipe which extends from the dome of the boiler. The other end of these pipes in the furnace connect with an eduction pipe, which extends to the still or retort. The steam as it passes through the pipes in the furnace becomes superheated. The end of the eduction pipe, which extends from the superheating furnace, passes into one end of the still or retort, extends through the length of the same in a series of coils, whose length stands vertically, resting in the body of oil in the retort, and finally passing out.

From the eduction steam pipe, which extends from the superheating furnace, a branch passes downward and connects by lateral branches with pipes which pass through the end of the retort, resting in the oil and provided with perforations by which live steam is injected into the body — oil.

At one end of the retort is an elbow-shaped pipe connecting with the interior and having a scale, by which means the height of oil in the retort can be seen at any time.

An exhaust pump is connected by pipes with the receiver under the water tank, by which means the air may be exhausted through all the connections back to and including the retort.

69 I find in this apparatus that the construction and arrangement of the still or retort is similar to that described in the Exhibit Everest Vacuum Apparatus Patent and forming the subject-matter of the second claim in that patent. That claim covers the construction of a horizontal elongated cylindrical or elliptical vacuum retort for petroleum, arranged and operated in the manner and for the purpose therein set forth. The advantage of this form of retort, as I understand it, over the upright form ordinarily used is that it presents a larger surface of the oil in a thin body than in the upright form, and therefore a greater degree of heat can be applied by the pipes resting in the oil and more rapid vaporation can take place. By this form of retort straight lengths of heated pipe can be used, these lengths resting within the body of the oil, and therefore a large radiating surface is attained which cannot be attained in an upright still. By this form of the still also a series of goose-necks can be attached for carrying off the vapor, being distributed over the whole length of the still and conveying off the vapor by a direct course.

I find by the testimony of the witness Groves and by reference to the model that the still or retort used in defendant's apparatus is of the horizontal elongated cylindrical form described in plaintiff's patent and claimed in the second claim, and therefore I think it is an infringement of this second claim.

I also find in defendant's apparatus, as described by witness Groves and shown in the model, that a series of goose-necks are used, which connect the horizontal retort with the condenser in the water tank. This construction is substantially the same as that described in plaintiff's patent and shown in his drawings. By the use of the series of goose-necks the exhaust which is produced
70 by the action of the pump is distributed through these goose-
necks by means of the condenser and is applied equally over the whole surface of the still, so that the action will be uniform from end to end of the still and there will be less tendency to draw the oil over from the still than where a single goose-neck is used, as in common stills. The action is also more effective in drawing off all the vapors uniformly, as their passage is direct from all parts of the still; whereas in common stills with a single goose-neck the passage is indirect to meet the point of escape; therefore the vapors are kept free in the retort and a more rapid distilling action is produced.

I find the third claim in complainant's patent covers the use in a vacuum still of two or more goose-necks connecting the still with the condenser so as to distribute the exhaust in the still, thus preventing the drawing over of the oil, at the same time facilitating the escape of the vapor; for this reason I think defendant's apparatus is an infringement of this third claim.

I find that the fourth claim in the plaintiff's patent claims so combining a capacious condenser or condensers with a retort or retorts and the condensing coil or coils that such capacious condenser or condensers will serve as a check to diminish the direct action of the exhaust pump upon the oil in the retort.

The drawing shows the condenser as connected with the retort by the goose-necks before described and beneath the condenser a condensing coil of pipe, which rests in the water tank.

I find the same construction described by the witness Groves and shown in the model, the condenser being connected with the retort by a series of goose-necks and a condensing coil of pipe being used under the condenser in the water tank.

71 By the use of the large condenser interposed between the
condensing pipe and the retort the force of the exhaust is broken or diffused over a large surface and the drain upon the retort is divided into a large number of passages, so that no sudden impulse will tend to draw the oil over, as it would if the whole force of the exhaust acted through a single pipe.

I understand the fourth claim in the complainant's patent to cover the combination of the retort, the large condenser connected with the retort by a series of goose-necks, and a condensing pipe under the large condenser, whereby, when the exhaust is applied, the large condenser breaks its force upon the retort.

The defendant's apparatus embodies this combination and operates in this manner, and for this reason I think it is an infringement of the fourth claim of plaintiff's patent.

Adjourned to 27th, 9 a. m.

THURSDAY, *February* 27, 1883—9 a. m.

Same appearance.

Witness OSGOOD continues:

The fifth claim in complainant's patent covers the receivers located below the condenser and between the vacuum pump and condenser in such a position that the distilled oil passes from the condenser to the receiver by its own gravity and without passing through the pipes connected with the pump, by which means the action of the pump does not interfere with the deposit of the oils nor does the deposit of the oils interfere with the action of the pump. I understand this claim to cover the combination of a condenser, a receiving vessel, and an exhaust pump, the receiving vessel being located lower than the condenser, so that the oil will run from the
72 condenser into the receiver by its own weight, and an exhaust pump connected by a pipe with the receiver in such a manner that the exhaust through the receiver will not interfere with the flow of the oil.

I find this combination in defendant's apparatus, the condenser being located higher than the receiver and allowing a free passage of the oil from the condenser to the receiver by its own weight, and the exhaust pumps being connected with the receiver in such a manner as to produce the exhaust through the apparatus without interference with the flow of oil. For these reasons I think defendant's apparatus infringes the fifth claim of defendant's patent.

The seventh claim of complainant's patent covers the combination of the vacuum still for petroleum, a steam generator, and an independent superheating furnace for superheating the steam. I understand this claim to cover the combination of these parts broadly, so that as the steam is generated in the boiler it passes through the superheating furnace, becomes superheated, and in this heated condition passes directly into the retort or still through the coils of pipe therein, and finally escapes.

I find this combination in defendant's apparatus, consisting of the boiler, in which the steam is generated, the superheating furnace alongside of the boiler through which the steam pipes pass, and the still or retort connected with the superheating furnace by a steam pipe, which allows the superheated steam to pass through the coils of pipe inside the still. This construction is an infringement of the seventh claim of complainant's patent.

The eighth claim of complainant's patent embodies the
73 same combination as the seventh claim, but in a more limited form, as it consists in constructing the independent superheating furnace alongside of the boiler in such a manner that the same fire used in the superheating furnace is conducted through a flue space (which I have called a port) at the rear of the boiler, and

thence passes into the furnace space of the boiler and assists in generating steam in the boiler, thus economizing in the use of fuel and increasing the effective capacity of the distilling apparatus.

I find this same construction in defendant's apparatus, as described by Groves, the same consisting of a superheating furnace lying alongside of the boiler and having a flue space or opening at the rear end connecting the interior of the superheating furnace with the furnace space of the boiler; therefore I think defendant's apparatus is an infringement of the eighth claim of the complainant's patent.

The ninth claim of complainant's patent covers the superheating furnace, provided with numerous sections of small pipes connected with the main pipes for induction and education of steam in such manner that the straight pipes are used inside of the superheating furnace instead of coils, thereby presenting a larger amount of heating surface than is ordinarily attained, increasing suitable heat without danger of explosion.

I find a similar construction in defendant's apparatus. The steam pipes within the superheating furnace being arranged in straight lengths standing lengthwise of the furnace, arranged in a similar way, and I regard this construction in defendant's apparatus as being an infringement of the ninth claim in complainant's patent.

74 The eleventh claim of complainant's patent covers the retort or still provided with a series of straight heating pipes extending horizontally through the still, the lengths of pipe standing in a vertical plane instead of being in coils, as is the case in common stills. By this arrangement a greater surface of heating pipe can be got in a given space, and it is also specially adapted to the form of the still, which is elongated and stands horizontally instead of upright, as in common stills. These lengths of straight pipe extend from end to end of the still and are easily applied and removed. The coil pipe used in ordinary stills could not be easily applied in this form of still, and if applied it could not be easily removed for repairs. This straight form of pipe, also, is best adapted to rest in and be covered by the body of oil in the still.

I find this same construction of the pipes in defendant's apparatus, and consider the same an infringement of the eleventh claim of the complainant's patent.

The twelfth claim of complainant's patent covers a gauge consisting of a pipe connected with the still or retort in such a manner that the oil can flow into the gauge and its height be indicated by scale marked on the gauge, so that the height of the oil in the retort can be known at all times.

The thirteenth claim of complainant's patent covers the combination of a steam generator, superheating furnace, and a vacuum apparatus. The vacuum apparatus consists, as I understand it, of the retort or still, the goose-necks, the condenser, the receiver, and the exhaust pumps, with suitable connections to make them operative. I find this combination shown in defendant's apparatus substantially as described in complainant's patent, and consider it an infringement of the thirteenth claim.

75 Cross-examined by Mr. ALLEN:

8 X. Have you made any study of the state of the art in respect to the claim of this patent which you have embraced in your testimony?

A. Not specially.

9 X. When you were called as a witness yesterday afternoon what amount of previous study and examination had you given to this case?

Objected to as incompetent and immaterial.

A. Very little at that time, but I had previously been familiar with the subject, having obtained the patent originally and talked frequently with the inventor at that time on the subject.

10 X. When you were first called yesterday had you seen the model about which you were expected to testify previous to your coming into this room?

Objected to as incompetent and immaterial.

A. I had not.

11 X. How recently prior to your coming in to testify had you read over the Everst apparatus patent, on which this suit is brought?

A. I cannot say; it was quite a number of years; I had read it, however, yesterday before coming in.

12 X. But not previous to yesterday since about the time that patent was granted?

A. I think I examined it from time to time for some time after the patent was granted; it is my opinion that I have not read it for ten or twelve years until yesterday; perhaps longer.

76 13 X. Are you acquainted practically with the manufacture of oils from petroleum, or have you had any experience therein?

A. I am not, and have had no practical experience.

14 X. Did you personally prepare the specification or drawing of the Complainant's Exhibit Everest Apparatus Patent?

A. I think I prepared the specification from a rough draft made by Mr. Everest, the inventor; I don't think I made the drawings.

Question objected to as immaterial.

15 X. Was not this specification drawn by Mr. Hyatt, who was associated with you at that time?

Same objection.

A. No, sir; but I think the drawings were made by Mr. Hyatt.

16 X. Had you previously drawn specifications in other cases of vacuum apparatus for distilling petroleum, or was this the first specification of that nature which you had drawn?

Same objection.

A. I had drawn others before.

17 X. For what inventors?

Same objection.

A. Mr. P. Ewing was one. I think, also, I had drawn some for Mr. Everest before, but could not tell without refreshing my memory.

18 X. Any other?

Same objection.

A. No others occur to my mind now.

77 19 X. Is your acquaintance with the state of the art prior to the Exhibit Everest Apparatus Patent limited to the patents referred to in your answer to the 17th cross-question?

Same objection.

A. I think not. I had more or less general knowledge about vacuum stills prior to that time.

20 X. At the date of this patent was a horizontal elongated cylindrical retort for petroleum new?

A. It was, so far as I am aware.

21 X. Supposing such a retort was shown prior to that time in numerous patents relating to the manufacture of petroleum, what effect would such a fact have on what you have said in answer to the last question of the direct examination relating to claim two of the apparatus patent?

A. If it were a vacuum still and were constructed with all the conditions necessary for the attachment of all the other parts necessary to operate in connection with it in the manner described, I should say it would anticipate the claim. I think much would depend upon circumstances.

22 X. A vacuum still with one goose-neck from the retort to the condenser was well known at the date of apparatus patent, was it not?

A. Yes; I think so.

23 X. That being the case, would there be invention in making a vacuum retort with two goose-necks leading from the retort to the condenser; in other words, would there be any invention in a mere duplication of parts?

A. There is no invention in a mere duplication of parts
78 where there is no difference in the effect produced, where one
merely adds to the other, but where a duplication produces a difference in effect or makes a thing operative where a single part would not be operative, then there is invention. In a long vacuum still, such as described, if a single goose-neck would cause a drawing over of the oil by the action of the pump, and if the vapors had to be drawn from the still from one end to the other by indirect force to find an exit, I think the use of two or more of the goose-necks, by which these difficulties are obviated, would be patentable.

24 X. Assume that the effect with the duplications is of the same kind as without it and varies only in the degree of the effect, would there be invention in such duplication?

A. I don't think there would.

Adjourned to 2 p. m.

2 P. M.

Same appearance.

25 X. Have you any such practical knowledge of the working of the apparatus in the complainant's apparatus patent that you are able to say that the duplication of goose-necks does prevent the oil from being drawn over, or, if any, what amount of duplication is necessary to prevent the oil being drawn over?

A I have no knowledge upon that subject from practice.

26 X. So far as facilitating the escape of the vapor by increasing the number of goose-necks is concerned, can you give any formula or rule for such an increase, or state at what point further increase of the number of goose-necks would cease to facilitate the escape of the vapor?

A. I cannot.

79 27 X. From what knowledge you have of the state of the art was it a new thing at the date of this patent to locate a receiver or receivers of the distillate beneath the condenser so that the distilled oil would pass into such receivers by its own gravity?

A. It was, so far as I know, but I do not predicate the fifth claim upon so broad a basis as that.

28 X. How, then, do you restrict it?

A. In view of the statement of the nature of the invention in the second paragraph from the bottom of page one of the specifications of the Everest vacuum apparatus patent I should say that the claim would be held to the combination of the condenser, the receiver, and the exhaust pump arranged in a peculiar way, viz., the condenser being placed higher than the receiver so that the oil will run into the receiver by its own weight, and the pump being connected with the receiver in such a manner that it does not interfere with the passage of the oil, neither does the passage of the oil interfere with the action of the pump. I think this is what I stated in regard to the fifth claim in my direct examination.

29 X. You are acquainted, are you not, in apparatus for distilling petroleum with the receiver of distillate being located in a lower plane then the condenser prior to this Everest patent?

A. I do not now recall an instance, though I do not know but there may be such a one.

30 X. Were superheaters known previous to the date of this patent?

A. Yes, sir; for general purposes.

31 X. Were they known in connection with stills for refining petroleum?

A. Not to my knowledge.

80 32 X. Do you think, then, that at the date of this patent a superheating furnace connected with an apparatus for distilling petroleum was a novelty?

A. I have no knowledge. It was new so far as I know.

33 X. In your answer bearing upon the seventh claim of this patent as given by you in direct examination you have assumed, have you not, that it was new?

A. I have assumed that the combination expressed in the 7th claim was new, and I suppose that it was—that is, a vacuum still, a steam generator, and an independent super-heating furnace.

34 X. At the date of Everest's invention vacuum stills—vacuum stills for petroleum—were old, were they not?

A. Yes, sir.

35 X. Steam generators were old?

A. Yes, sir.

36 X. Superheating furnaces for heating steam were old?

A. Yes, sir.

37 X. But you suppose they had never been put together before?

A. I suppose not. Of course it is necessary to use with the combination of these three parts such additional parts or connections, such as pipes, as will make an operative arrangement. It is necessary to use a steam connection between the generator and the superheater and a steam connection between the superheater and the still. The use of these connections follows from necessity, though not mentioned in the claim.

81 38 X. I call your attention to the pipes within the retort in Complainant's Exhibit Model Defendant's Vacuum Still, and I ask you whether, if the longitudinal sections of these pipes were arranged within the retort in a lateral position relatively to each other instead of a vertical one, the eleventh claim of this patent would, in your opinion, be infringed?

A. I have some doubt in regard to that. By arranging them vertically, as shown, I think there are some advantages, as they stand side by side and occupy less space, and the heating capacity will therefore be increased and a better action of the still will be produced. Then there might be some advantages in removing them from the still, which perhaps I do not understand, not being practically acquainted with the works, but I am not prepared to say whether or not the difference in position would be patentable. There is one advantage which would be common to both forms of the pipes, and that is that they are made in straight lengths, and in that form are adapted to extend from end to end of the elongated still, furnishing a heating surface the whole length, and from their straight form being in condition to be easily removed from the still. In view of these facts, it seems to me a sufficient novelty to cover either the vertical or horizontal form of the pipes. It seems to me that the novelty consists more in the use of straight pipes fitted into the elongated still, and especially adapted to that form of still in contradistinction to an upright still, than in any peculiar way in which the pipe stand.

39 X. You are under the impression, then, as I understand it,
from what you know of the state of the art that at the date
82 of Everest's invention straight steam pipes running length-
wise in a petroleum still were unknown?

A. I don't know anything about that. It would be mere guesswork on my part to say it was so; but I think there is a special relation between the peculiar form of the still used in this case and the steam pipes used within it. Straight steam-heating pipes of a similar form for heating purposes were old, I think, at the date of this invention.

40 X. But the basis of claim eleven in the patent is rested, is it not, on the position "placing the small sections of heating pipe in the retort in an upright position?"

A. From the form in which the claim is drawn it might be so inferred. I should consider the novelty of the claim, however, to be the combination of the horizontal, elongated still and the series of steam pipes within the same arranged in straight lengths and so located as to attain the most effective action of heating and to be easily inserted or removed. My only doubt, as expressed in the former answer, was whether the horizontal form of the pipe was the equivalent to the vertical form; but, as I have before stated, the action is so similar and the difference is so slight that I should consider the horizontal position merely as a modification.

41 X. Suppose that the horizontal position referred to in your last answer was well known at the date of the Everest invention; what then would become of this claim?

A. If the combination of the vacuum still and retort made elongated and resting horizontally, and the straight lengths of pipe resting horizontally in the still were known prior to that time,
83 then, under the conditions of my previous answer, I should consider that claim as invalid.

42 X. Was the application of an oil gauge to a petroleum still for the purpose of observation of the quantity of oil in the still something well known at the date of Everest's invention?

A. I presume it was; I don't know.

43 X. Had a similar vacuum gauge been in common use upon vacuum pans for sugar prior to the date of Everest's invention?

A. I could not say. I think the novelty of the gauge shown in this patent consists in the construction, there being an upper and lower arm or pipe opening from the retort extending outward at a distance and connected by a vertical tube on which the scale is marked; a circuit is then made which preserves the vacuum and allows the oil to rise and fall in the vertical tube without impediment. I have no knowledge of ever having seen a gauge of this form prior to this patent.

44 X. Have you ever at any time specially examined the state of the art on that subject?

A. No, sir.

45 X. I show you specification and drawings of the Ewing patent, number 58020, dated September 1, 1866, referred to in one of your previous answers in cross-examination, and I ask you whether in that patent you find a horizontal, elongated cylindrical vacuum retort for petroleum?

A. I do to a certain extent. The proportion of length and height is such that the length is about double the height.

84 46 X. In this patent do you also find straight steam pipes within the still arranged parallel lengthwise or longitudinally within the still?

A. Yes, sir.

47 X. Are the ends of these pipes within the still connected by vertically or latterly placed connection pieces?

A. I see that some of the pipes are connected by elbows which stand horizontally.

48 X. Having in view steam pipes shown horizontally, placed within the horizontal, elongated cylindrical vacuum retort just referred to, under the views which you have already expressed relating to claim eleven, what becomes of the validity of this claim?

A. There is this difference between the arrangement of the pipes in the retort, shown in Complainant's Exhibit Everest Vacuum Apparatus Patent and the patent of Ewing. In the complainant's patent the lengths of pipe I are made in separate sections and so located in the retort that they can be readily removed and taken out of the cylinder for repairs or for other purposes. The same is true in defendant's apparatus, shown in Exhibit Model Defendant's Vacuum Still. Each of these sections of pipe is made of two lengths, forming in substance one piece, which is removable alone from the interior of the cylinder without disturbing other parts. This enables repairs to be made with great facility and ease.

In Ewing's patent, as I understand it, the ends of the heating pipe inside of the cylinder pass out through the end of the cylinder and are connected with steam mains outside, one being an induction main, to which one end of the pipe is attached, the other being an eduction main, to which the other end of the pipe is attached. These parts are all connected, so that the loop of the pipe rests within the cylinder, the outer ends extending out and being permanently attached to the steam mains outside. So far as I can see, no provision is made for the easy removal of these heating pipes inside of the cylinder In order to remove them the connections would have to be torn apart and a damage would ensue, not only to the steam pipes, but also to the mains and to the cylinder. The patentee in that case, so far as I can see, had no idea of any provision for the ready removal of the steam pipes.

In complainant's patent one object of the invention is to so construct the pipes in the retort that they may be readily removed at any time.

49 X. As I understand it, the free ends of the still pipes in complainant's patent pass through the heads of the retort and are fastened to the chests K and K, bolted to the heads of the retort. Do you find any such chests in the exhibit model in this case?

A. No, sir.

50 X. You don't find, then in this model, you say, an external fastening for the ends of the pipe as are shown in complainant's patent?

A. No, sir.

51 X. Upon what grounds, then, can you say that any infringement at all exists in the case of the eleventh claim of complainant's patent?

A. Only upon the ground of the combination of an elongated horizontal still and a series of pipes made in sections resting within the still and readily removable from place. As I before stated,

there are some advantages, also, in the vertical position of the sections of pipe by which they are placed—a more compact
86 position, and may perhaps be more easily removed, although, not being a practical workman in this class of apparatus, I cannot state to what degree this may be an advantage.

52 X. You fall back, then, substantially on the idea that under the words of this claim what novelty there is must consist substantially in the vertical arrangement?

A. I have not so stated.

53. If not, specify what words in the claim set forth some other basis on which it can be sustained.

A. Referring to my previous answer, I have set forth in the first portion of my answer the general advantages resulting from the combination of the long horizontal still and the steam pipes, which are so constructed as to be readily attached and detached. The advantages of such a construction would result from either form of the pipe, whether vertical or horizontal. In the latter part of that answer I also state that by the vertical form of the pipes some special advantages result from that form. In regard to the claim, I do not find the functions and advantages of the arrangement set forth and do not understand that they should be in the claim, but should be embodied in the specifications.

The answer objected to as not responsive to the question and the question repeated.

54. Same as 53.

A. The words of the whole claim as follows: "Placing the small sections of heating pipes in the retort in upright positions, substantially in the manner and for the purpose set forth."

55 X. And no portion of this language more than any other?

87 A. No, sir.

Redirect by Mr. Seldon:

56. State whether or not, in your opinion, the specification of the said patent, No. 68426, "Complainant's Exhibit Everest Apparatus Patent," contains a sufficiently full, clear, and exact description of the invention therein described and claimed as to enable any person skilled in the art to make and operate practically the said invention.

A. I think it does.

57 X. What is the difference in character between superheated steam and steam ordinarily produced by steam generators?

A. Its heating qualities are greatly increased, and, as I understand, it becomes practically dry, or is deprived of a great portion of its moisture.

Examination closed.

RUFUS F. OSGOOD.

Taken, read, subscribed, and sworn to before me Feb. 28, 1883.

ADELBERT CRONISE,
Notary Public and Sp. Ex.

JOSEPH ROE, being duly sworn, testified as follows:

1. What is your age, residence, and occupation?

A. About 60; reside at 38 Jay street, Rochester, N. Y.; am foreman at J. E. Jones' furnace.

2. Has your foundry been in the habit of furnishing castings for the Vacuum Oil Company for a number of years past?

A. Yes, sir.

88 3. Did you know a man by the name of Miller, who was at one time in the employ of the Vacuum Oil Company?

A. Yes.

4. State whether or not during the month of March, 1881, Miller ordered from you some castings for a steam superheating apparatus.

Objected to as irrelevant.

A. I have such an order on the book and think it is right.

5. Can you produce your book? And, if so, please do so.

Witness says, "Yes," and produces book, and points out an entry of which the following is a copy;

MARCH 17TH, 1881.

X 2 long header pipes.
X 2 short do.
X 3 covers &
X 3 castings to hang covers to.

VACUUM OIL CO.,
Pr. MILLER.

Same objected to—first, in that the subject-matter of the entry is irrelevant; second, that it is not connected with the defendant; third, that it is not competent evidence, the witness who made the entry being present, who should testify his own recollections.

6. In whose handwriting is this entry?

A. In my own.

Entry further objected to as, fourth, *res inter alios acta.*

89 7. Do you recollect this transaction with Miller independently of your entry in the book?

A. I should say yes.

8. You have referred to the book to refresh your recollection and fix the date?

A. Yes, sir.

9. Did you make these castings for Mr. Miller according to this order?

A. As far as I am concerned, I suppose they were made; I do not always see an order way through. I sometimes take orders for things, get the patterns ready, and they are delivered from the office without my seeing anything more of them.

Mr. Allen objects to the witness testifying to what he supposes or to anything but his personal knowledge.

10. Whose patterns did you use in executing this order for Miller?

Objected to as immaterial and irrelevant.

A. The patterns belonged to the Vacuum Oil Company.

11. Can you describe the shape and dimensions of the header pipes referred to in the entry in your book?

Same objection.

A. I could not describe the dimensions, but I could tell something of the shape of them. Both long and short pipes were of cast iron, designed to have holes tapped in for wrought pipes. The castings to hang covers to were made to fasten to the end of other cast-iron pipes and the covers hung to the last I speak of.

90 Cross-examined by Mr. Allen:

12. Same waived.

JOSEPH ROE.

Taken, read, subscribed, and sworn to before me Feb. 27, 1883.

ADELBERT CRONISE,
Notary Public and Sp. Ex.

Marshall Bannister, being duly sworn, testified as follows:

1. State your name, age, residence, and occupation.

A. Marshall Bannister; age, 38; residence, 133 Frank street, Rochester, N. Y.; book-keeper for J. Emory Jones' foundry.

2. Did you hear the testimony of the last witness, Mr. Roe?

A. Yes.

3. State what personal recollection you have of the transaction with Mr. Miller referred to by Mr. Roe in his testimony.

A. I have no recollection of the transaction, as far as Mr. Roe is concerned in it. I have a very distinct recollection, though, of some castings being made for the Vacuum Oil Company.

Evidence objected to as irrelevant and immaterial.

Witness continues: At least it was so given to me in the office. I don't find these castings charged to the Vacuum Oil Co., however; and my recollection is it was Saturday afternoon a man came there, had a bill made out to the Vacuum Oil Co. for these castings, paid for them, and took them away.

Same objection as to the like matter of witness Roe.

91 4. How was the Vacuum Oil Company in the habit of settling their bills with you?

Objected to as immaterial and irrelevant.

A. They have whatever they get there charged, and we render our bill in a month or quarter and they settle by check.

5. Have you any memorandum book that shows an entry in relation to this transaction?

A. Yes, sir; I have a book what we call our casting book, which shows an entry of March 19, 1881, of castings weighed to the Vacuum Oil Company, which are the same that I have referred to before; the weight was 292 pounds.

6. Have you examined your accounts with the Vacuum Oil Company to see if this item was charged to them?
A. I have; it is not charged.

Same objection as to last two questions and answers.

7. Do you know if the man to whom you delivered these castings was in the employ of the Vacuum Oil Company or had been?

Same objection.

A. I know that he had been in the habit of coming and ordering castings for them.
8. What, if anything, caused you to have a particular recollection of this transaction.

Objected to as cross-examination.

A. Shortly after this I heard that the man who got these castings had left the employ of the Vacuum Oil Company and gone to Buffalo, and it struck me as being a little irregular way.

92 Answer objected to as hearsay, irrelevant, and incompetent.

Cross-examined by Mr. Allen:

9 X. What was the price paid for these castings?
A. I could not state positively.
10 X. About?
A. The Vacuum Oil Company were paying three cents at that time, and I presume he paid the same, making the 292 pounds $8.76.

Redirect by Mr. Seldon:

11. The fact that a man who purported to represent the Vacuum Oil Company paid cash attracted your attention, did it not?

Objected to, first, as leading and not proper redirect examination and argumentative examination, and wholly irrelevant and immaterial.

A. Not specially, at the time, but it did when I heard he had left there.

Examination of witness closed.

MARSHALL BANNISTER.

Taken, read, subscribed, and sworn to before me February 27, 1883.

[L. S.] ADELBERT CRONISE,
Notary Public and Special Examiner.

Walter Groves recalled for complainants:

Mr. Allen objects to the witness being recalled, as he has been once examined-in-chief, and on cross-examination he declined to answer the questions put to him. This is a reason why the court should not allow him recalled in this case.

93 103. Have you ever on any occasion been arrested on the charge of smuggling or any other charge?

Objected to; the subject is closed in the previous deposition.

A. I have not.

104. What daily wages did Mr. Curtin agree to pay you while you were engaged in this case?

Same objection.

A. Three dollars a day.

105. Where were you born?

A. In the city of London, England.

106. How old were you when you came to America?

A. Ten years.

107. Where did you live and with whom, from the time you arrived in America and until you went to Buffalo?

A. I staid with a party by the name of Lampman, in the township of Gainesborough, Canada, for six years; then I went to Welland; there I staid with Rev. A. L. Gee.

108. What was your object in going to Buffalo?

A. To make an honest living.

109. Can you recollect definitely how long you were in Buffalo before you entered defendant's employ?

A. I cannot.

WALTER GROVES.

Taken, read, subscribed, and sworn to before me Feb. 27, 1883.

ADELBERT CRONISE,
Notary Public and Sp. Ex.

Adjourned to 7.30 p. m.

94 7.30 P. M.

Same appearance.

Adjourned to Feb. 28, 2 p. m.

FEBRUARY 28—2 P. M.

Same appearance.

Complainant's counsel states that his *prima facie* case is now closed, reserving the right before defendant's case is closed to introduce and prove samples of the lubricating oil made by defendant, and also the right to introduce proofs that Albert A. Miller was at one time connected with the defendant's corporation.

Defendant's time is extended to July 1, 1883.

ADELBERT CRONISE,
Special Examiner.

I, Adelbert Cronise, notary public and special examiner, duly appointed herein, do hereby testify—

That the foregoing is a just and true report of all proceedings had and all testimony taken before me on behalf of complainants herein.

That each witness was by me duly cautioned and sworn to testify the whole truth, his testimony by me reduced to writing, and thereafter read, subscribed, and sworn to by deponents before me and in the presence of counsel.

That I am not attorney nor of counsel for either of the parties herein nor related thereto, nor interested in the event of this action.

Rochester, N. Y., Feb. 28, 1883.

[L. S.] ADELBERT CRONISE,
Special Examiner and Notary Public.

95 *Complainant's Rebuttal Testimony.*

United States Circuit Court, Northern District of New York.

THE VACUUM OIL COMPANY
vs.
BUFFALO LUBRICATING OIL COMPANY.
} Equity. 3748.

Testimony taken and proceedings had before me, as special examiner on behalf of complainant, pursuant to agreement, at 24 Power's buildings, Rochester, N. Y.

FRIDAY, *January* 25, 1884—11 a. m.

Complainant appeared by T. G. Outerbridge, Esq., solicitor, and Geo. B. Selden, Esq., of counsel; defendant appeared by James A. Allen, Esq., of counsel.

Adjourned by consent to 2 p. m.

SAME DAY, 2 P. M.

Same appearances.

RUFUS F. OSGOOD, being duly sworn, testified as follows:

1 Q. State your name, age, residence, and occupation.

A. Rufus F. Osgood; 51 years; Brockport, N. Y.; solicitor of patents.

2 Q. Have you been previously examined in this case?

A. I have.

96 3. Have you examined the various patents and publications introduced in evidence by defendant in this case, and marked Defendant's Exhibits A to Y, inclusive?

A. I have.

4 Q. Have you read the testimony of defendant's expert, Wilhelm, and do you understand the same?

A. I have, and do understand it.

5 Q. Please compare the invention specified in the third claim of the Everest Patent, No. 68426, with the inventions described in the Gengember, Hamilton, and other patents mentioned by the said witness Wilhelm, and state your opinion as to the novelty of the invention described in the third claim of said Everest patent, and give your reasons therefor.

A. The third claim in the Everest patent relates to a vacuum still in which an exhaust is produced by a pump, and the third claim consists in the combination of retort in which the vaporization is produced, a condenser, and two or more goose-necks connecting the retort with the condenser or condensers in such a manner as to distribute the exhaust in the retort and thus prevent the drawing over of the oil and at the same time facilitate the escape of the vapor. The essential features are—

First. A horizontal and elongated retort which allows the oil to be spread over considerable surface to receive the best action of the heat, which is desirable where steam is applied, as is done in this apparatus; and

Second. The use of a series of goose-necks, two or more, opening from the retort at given intervals apart so as to remove the vapor by a direct action from all parts of the retort without taking a circuitous course or producing any stagnation in the action.

Third. A condenser or condensers, into which the opposite ends of the goose-necks open for the purpose of receiving the vapors and condensing the same. This condenser, if made in one vessel, being of sufficient length to receive all of the goose-necks as they extend in parallel lines from the retort, or, if separate condensing
97 vessels are used, one to each goose-neck, said separate condensers being arranged in a line parallel with the retort for the same purpose.

The object of this arrangement, as I understand, is to produce an equal and uniform draft of the suction upon all parts of the elongated retort, so that as the vapors are raised in the retort they are at once drawn over in a direct course through all the goose-necks and preventing any stagnation or backing up, such as would occur if but a single goose-neck opened from the elongated retort. By this means also the draught is so equal, and it is so diffused or spread through the whole retort that there is no tendency to draw over the oil by any sudden impulse of the pump, as would be the case if a single goose-neck were used with a retort of such length. This form of the apparatus, having an elongated retort, a series of goose-necks, and a corresponding condenser or condensers, is specially adapted to the distillation of petroleum under vacuum, and by the use of steam heat.

On examining Gengembre's patent I find it is an apparatus for the destructive distillation of oleiferous minerals, such as shale, bituminous slates, cannel coal, for the purpose of extracting therefrom oils and tar. The use is not analogous to that in complainant's invention. The heat is applied by direct fire, producing destructive distillation, instead of by steam heat, as in the complainant's case. The retort, instead of being of the elongated horizontal form, as in plaintiffs' case, is of L shape, a portion being horizontal and a portion vertical. Instead of a series of two or more goose-necks opening from the retort at regular intervals apart, as in complainants case, a single goose-neck or discharge pipe with two branches connect- with the vertical part or tower of the retort. These two branches, I find on examining the drawing, are much larger in diameter than the main pipe with which they connect, the lower one being at least double size. Therefore the capacity of the main pipe to convey the gas is much less than that of one of its branches. This pipe in effect forms but a single dis- 98 charge for the gas and is but a single goose-neck. In my opinion, it could have no such effect as the series of goose-necks in complainant's case—that is, it could not equalize the action upon all parts of the retort. The effect, I think, would be for the draught to take the shortest course, drawing more through the lower branch of the pipe than through the upper one. Therefore the action upon the interior of the retort would be unequal and irregular.

I find that this apparatus of Gengembre's is not a vacuum apparatus, but that the gases, after being drawn from the retort and through the condensing and washing apparatus, are forced back again to the retort through a long pipe, thereby making a circuit and preventing any vacuum. Moreover, it would be impracticable, under the conditions under which the apparatus is used, to make it so tight as to practically exclude air sufficiently to form a vacuum under ordinary means.

The pump used in this apparatus of Gengembre is not practically an exhaust pump for exhausting the retort, but is more especially a force pump for forcing the gases back through a long pipe to the retort again.

For these reasons I find that this apparatus does not anticipate the third claim in complainant's patent and is not the equivalent therefor.

I find that Hamilton's patent, Defendant's Exhibit S, is for the purpose of distilling resin and resinous substances, and consists of a still or retort in which the material is distilled, a pipe leading from the retort for conveying away the vapor, a condensing worm with which said pipe connects, a refrigerating vessel or condenser through which the worm passes, and vessels for receiving the material which passes through the worm.

I find that the pipe which leads from the retort or still for discharging the vapors is similar in general arrangement to that in Gengembre's case. A single pipe is used with several branches or connections which open from the still and unite with the main pipe.

99 I find, on examining the drawings, that these branches which open from the still are larger in diameter than the main pipe, and that the capacity of each is as great as or greater than that of the main pipe. Therefore what I have said as to the effect in Gengembre's case applies equally as well in this case. He describes their branches as resting one above another, the upper one being used for drawing off the vapors when the material is the highest in the still, the other branches being used in succession, one after another, as the material is gradually lowered in the still. He states it as an object to construct the still or retort in such a way that in place of the outlet orifice being at the head of the still the vapor leaves the still as near the surface of the contents of the still as practicable.

"To accomplish which I construct the still with several outlets, one below another, and which are provided with stop-cocks, which can be opened in succession as the contents of the still are reduced, or I construct the still in such a manner that it may be mounted on an axle or a pair of trunnions, so that it may be tilted on one side that the outlet orifice may be lowered at pleasure during the operation of distillation."

From the above it will be seen that it is an object of the inventor to keep the discharge orifice near the surface of material which is being distilled, and that he does this either by opening the stop-cocks in succession in the pipes, or that he tilts the still so that the outlet orifice may be lowered at pleasure. In the latter case it is quite evident that but a single discharge is used, and that the several branches are dispensed with.

It is equally clear that as the material lowers in the still the upper branches are closed by the stop-cocks as the lower ones are opened. For these reasons it is clear to my mind that the single discharge pipe, with its branch connections, does not anticipate the independent series of goose-necks embodied in complainant's patent.

Adjourned to Saturday, January 26, at 10 a. m.

100 SATURDAY, *January* 26—10 a. m.

Same appearances.

Testimony of RUFUS F. OSGOOD continued:

In Reese's patent, "Defendant's Exhibit A," I find that a long cylindrical still is used with three goose-necks opening from the top thereof, but no condensers are shown, and the inference is that the common condenser is used. No exhaust is used in this apparatus; therefore it is not a vacuum apparatus. I find that the still is divided crosswise by partitions which rest between the goose-necks and extend from the top of the still down to near the bottom, leaving only a small passage at the bottom for the circulation of the oil and practically dividing the still into as many separate chambers as there are goose-necks, each goose-neck opening from one of these chambers and discharging only from that chamber. The action is such, therefore, as would be produced by the use of as many separate stills as there are goose-necks.

I can find in this Reese patent no anticipation of the third claim in complainant's patent, for the reason that the combination is not met. There is no combination in a vacuum apparatus of an elongated still, a condenser or condensers, and a series of goose-necks arranged in such a manner as to distribute the exhaust in the retort, as I have before described, or prevent the drawing over of the oil.

In Ewing's patent, "Defendant's Exhibit Q," I find a still with which are combined two goose-necks, two condensers, and two sets of connecting pipes and apparatus for the purpose of discharging the oil and for producing an exhaust. This still, however, is of the vertical form and not of the elongated and horizontal form described in complainant's patent; the condensers also are jet condensers. The goose-necks are arranged with cocks in their length which can be opened and closed for letting on and cutting off the flow.

The construction and arrangement are totally different from
101 those in complainant's patent and embodied in his third claim. The object is also different; it is not for the purpose of distributing the exhaust in the retort or preventing the drawing over of the oil; but, as he states in his specification, the object is to combine two or more condensers with the still so arranged that each may be used alternately to preserve the vacuum and insure a constant action of the still. To do this when one condenser and its attachments are in operation the other condenser and its attachments are cut off from action with the still by closing the stop-cock. For these reasons it is my opinion that this Ewing patent does not anticipate the third claim in complainant's patent.

For the same reasons before stated I do not think the construction shown in "Defendant's Exhibits E, I, B, K, F, and D" anticipate the third claim of complainant's patent, because in each of those exhibits only a single goose-neck is shown.

Q. Please make a similar comparison in reference to the fourth claim of the Everest patent, giving your reasons for any opinions you may express.

A. The fourth claim claims the combination of the capacious condenser, the retort, and the condensing coils in such a manner that the condenser will serve as a check to diminish the direct action of the exhaust pump upon the oil in the retort. This claim is similar to the third, and the same reasons given in considering the third claim apply in this. An elongated retort is used, lying horizontally; a long condenser or a set of condensers are used parallel with the retort; a set of independent goose-necks are used connecting the retort with the condenser, and a set of coils are used below the condenser through which the exhaust from the pump acts. The condenser being located between the coils and the retort, when the exhaust is applied through the coils from the pump the capacious condenser acts as a break between the coils and the retort, so that under any sudden impulse through the coils there will be no
102 tendency to draw the oil over from the retort through the goose-necks, but the draw will be made upon the large space enclosed in the condensers.

This forms a special construction and arrangement by which the single pump can be made to act upon all the goose-necks at once, the action on each being independent of that upon the other.

In Gengembre's case, "Defendant's Exhibit G," the construction and operation are entirely different. In the first place there is no liquid evaporated in the still; therefore there is no danger of drawing over, as in the complainant's case. Any draft made upon the still would simply draw out gas, which is a special object in that invention. The inventor states that it is desirable to withdraw the gas as rapidly as possible. In complainant's case the object is to prevent the drawing over of a liquid, at the same time facilitating the escape of the vapor. This difference in use necessitates a difference in construction. It is apparent that the apparatus used in Gengembre's case would not answer the purpose in complainant's case. It is necessary in complainant's case to make such proportion of the size of the condenser to that of the retort that it will act effectively through all parts of the retort by means of the goose-necks. In Gengembre's case there evidently is no such proportion between the tank "*i*" and the retort; neither is there the same proportion between the tank "Z" and the retort. It is evident that the tank "*i*" is intended to be small for the reason that a single pipe only connects with it. For the reasons above stated, in my opinion, the fourth claim of complainant's patent is not anticipated by the Gengembre patent.

In Hamilton's patent, "Defendant's Exhibit S," the construction and arrangement are totally different from that in complainant's patent. A kettle-shaped still is used instead of an elongated one; a single discharge pipe or goose-neck instead of a series of goose-necks. I find that there is no capacious condenser such as described in complainant's patent. The coils of pipe pass through a condenser 103 or tank and then extend to the receiving vessel, and this receiving vessel, marked "M," is the only device between the pump and the retort in which any empty space or void is presented whereby the action of the pump can be checked. This receiver comes outside of and beyond the coils of pipe, and is not interposed between the coils of pipe and the retort, as in complainant's case, for the purpose of checking the draft upon the retort. On the contrary, the pump is constantly drawing through the coils of pipe directly upon the retort.

By combining the condenser between the coils of pipe and retort, as in complainant's case, the condenser is brought close up to the retort and is made effective in its action to check the draft upon the retort through the goose-necks, so that in such case there is no danger of the pump drawing the oil over; but in Hamilton's case, by reversing the construction and locating the coils of pipe between the retort and the receiver "M," to which the pump is applied, there is no such action to check the overdraw of oil from the retort. For these reasons I do not think that Hamilton's case anticipates the fourth claim of complainant's patent.

I would say here that the parts embraced in the fourth claim of complainant's case present a combination of particular parts not shown in either of the references cited:

Adjourned by consent to 2 p. m.

SAME DAY, 2 P. M.

Same appearances.

Testimony of RUFUS S. OSGOOD continued:

7 Q. Please examine the Defendant's Exhibits "A" to "Y," inclusive, and enumerate those in which there is no description of any apparatus for producing a vacuum.

104 Answer.—

Defendant's Exhibit "A," Reese's patent.
" "C," patented to Tait & Avis.
" "D," " " Kelly & Tait.
" "G," Gengembre's patent.
" "I," Vanderweyde's "
" "J," Horner's "
" "K," Gilbee's "
" "N," Millochar's "
" "R," Thirault's "
" "U," Isaac Newton's "
" "V," Elmer's "
" "W," Bassett's "

Adjourned to Wednesday, 30th, 10 a. m.

WEDNESDAY, *January* 30, 1884 —10 a. m.

Same appearances.

The witness OSGOOD resumes:

I complete the list by adding thereto Defendant's Exhibits "X" and "Y."

I have included the Gilbee patent in the list, "Defendant's Exhibit K," because, although he mentions a partial vacuum or an "intermittent vacuum," it is very evident that he has no intention of producing a complete vacuum, as his object is simply to draw off the gases as they accumulate, in consequence of the destructive distillation of the fats going on in his apparatus, and for the purpose of maintaining the temperature in his still within the bounds which he describes—that is, between 660° and 678° Fahrenheit.

I have placed Gilbee in the list for the further reason that he does not describe his exhaust apparatus in such a way that it can be understood from the specification and drawings; in fact he gives
105 no description of the device by which the exhaust might be
produced. Whatever his device for this purpose was it was intended to operate in an intermittent manner. A pump or vacuum apparatus generally consists of a piston moving in a suitable cylinder and provided with inlet and outlet valves. Gilbee's drawing shows neither a piston nor valves, and a mechanic would be compelled to guess at the construction of the apparatus by which to produce the "intermittent vacuum" mentioned in the Gilbee specification.

On this subject I fully agree with the defendant's expert, Wilhelm, where he says, in answer to cross-question 43, "I cannot say from an inspection of the drawing what the particular construction of the air pump is which is shown therein." In my judgment no mechanic could construct the "intermittent" vacuum apparatus of the Gilbee patent without experiment.

8 Q. Please compare the invention claimed in the seventh claim of the plaintiff's patent with the inventions set forth in the defendant's exhibits in evidence herein and give your reasons for any opinion you may express.

A. The seventh claim of the plaintiff's patent covers the construction of an independent superheating furnace for superheating steam with a steam generator and a vacuum still for petroleum, the whole apparatus being constructed and arranged to operate as set forth in the patent—that is, the steam generator being passed through the independent superheating furnace, where it is superheated or raised in temperature, before it enters the vacuum still, where the distillation of the oil is effected by the heat of the superheated steam, while the pressure is reduced by the constant action of the exhaust pump. It is necessary in the first place to produce as nearly as possible a perfect vacuum in the apparatus for the purpose of facilitating the raising of vapor without subjecting it to the pressure of the
106 atmosphere, thereby producing a greater effect with a given
amount of heat; therefore one necessary element of the claim is an apparatus in which a substantially constant vacuum is obtained.

Another feature of the claim is an independent superheating furnace, by which the steam from the steam generator is economically superheated to a high degree before passing to the still, so that the whole operation of the distillation of the oil in the vacuum still may be accomplished by the heat of the superheated steam alone, without any other source of heat applied to the still, thereby avoiding the direct application of fire to the still, which produces destructive distillation and injures the oil by burning, and also obviating the difficulty connected with the use of ordinary live steam direct from the steam generator, which does not contain sufficient heat to produce the desired result.

I find that the combination of the above-mentioned parts is clearly described in the specification of the plaintiff's patent, being particularly mentioned in the statement of the invention at the beginning of the specification, in the second paragraph from the bottom of the right-hand column of page 1 of the printed Patent Office copy, as follows: "Also in the construction and use of an independent superheating furnace for superheating steam when used in combination with a steam generator and a vacuum still for petroleum, as hereinafter set forth."

Recess till 2 p. m.

SAME DAY, 2 P. M.

Same appearances.

Witness OSGOOD continues:

I do not find the combination recited in the seventh claim of the plaintiff's patent, arranged to operate as described in the specification thereof, in any of the defendant's exhibits. The only inventions contained in any of these exhibits which, in my opinion, have
107 any resemblance to that claimed in the seventh claim of the
Everest patent are those of Gilbee, Defendant's Exhibit "K," and Tweddle, Defendant's Exhibit "H." Gilbee's invention relates to an apparatus for distilling neutral fats and fat acids, and consists of a retort, in which the materials are placed, having two furnaces,

one for applying fire directly to the still for heating the fats, the other containing a coil of pipe for superheating steam, which is injected into the fats in the retort, so as to effect a chemical decomposition of the materials therein. The gases produced by the chemical reaction in the retort or still are led off from the still through a passage into a coil of pipe resting in a condenser and thence are said to be drawn away by a pump, the construction of which, as I have already stated, I do not understand, nor do I understand the method of drawing away the gases, which is said to be accomplished by an intermittent vacuum. In this apparatus of Gilbee, as far as I can gather from the specification, the purpose of the intermittent vacuum was merely the removal, from time to time as they accumulated in the still, of the gaseous products resulting from the chemical decomposition therein, in order to maintain the heat in the still within the range of temperature mentioned in the specification.

It will be seen that the object of Gilbee was entirely different from that sought to be obtained by the complainant, since the only object of Gilbee was to produce an intermittent vacuum just sufficient to remove the gases, while the object in the complainant's invention was to produce an entire and complete vacuum throughout the whole apparatus for removing the atmospheric pressure from the still and facilitate the vaporization of the oil. Therefore in these respects the two apparatuses are radically different, and one is not the equivalent of the other. Aside from this there is a great difference in the application of the superheated steam. In Gilbee's case the superheated steam is carried through the pipe which extends down into the still through the body of fatty material placed 108 therein and is opened at the bottom, so that the whole body of the superheated steam is injected directly into the fat. This, as I understand it, is for the purpose of producing the decomposition of the fats.

In complainant's apparatus the superheated steam passes through coils or lengths of pipe which rest in the still and are submerged in the oil, and is used simply for heating the oil to produce the vaporization, the pipes being closed so that the steam simply passes through, imparting its heat without being injected into the body of oil. This is the main object of the superheated steam in the complainant's case. The object is to substitute the heat of superheated steam in place of direct fire to the still, as is done in Gilbee's case. At the same time a small portion of the superheated steam is passed through separate pipes at certain times during the distillation process and injected into the body of oil in a manner similar to that in which all the superheated steam in Gilbee's case is injected into the body of fat; but, as I understand, this is not a main object of the superheated steam in complainant's apparatus, the main object being, as I have before stated, to provide a heating medium by passing superheated steam through closed pipes, said heating medium being of sufficient power to distil the heavier grades of oil without the application of direct fire to the still.

Therefore I find that the superheated steam in these two cases is applied to entirely different uses and in different ways, which are in nowise analogous.

In my opinion it would be impracticable to distil oil in Gilbee's apparatus. If done at all it would be done by destructive distillation, which burns the oil and imparts bad odors, the very objections sought to be avoided in complainant's invention. To make it effective for distilling oil many changes would have to be made. A pump would have to be applied which could produce constant suction to create a vacuum. Superheated steam would have to be applied, passing through close pipes in the still to produce proper heat.
The heating furnace under the still must be dispensed with;
109 and in my opinion it would be impracticable to inject such a
quantity of the superheated steam into the body of oil as to
produce the distilling action.

Tweddle's device, Exhibit H, consists of a still, a condenser, a pipe leading from the top of the still and coiled through the condenser, and receivers connected by a pipe with the coils in the condenser, and a device for producing a vacuum in the apparatus. Two sets of pipes are located in the still, one set being for the purpose of distilling off the lighter portions of the oil, through which, as I understand, common live steam is admitted for producing a medium heat for the distillation of the lighter portions of the oil, the other set of pipes being used for receiving superheated steam for the purpose of distilling off the heavier portions of the oil. This last-named set of pipes, marked "E" in the drawings, ends in a circle at the bottom of the still, and is perforated for the purpose of allowing a discharge of the superheated steam by injection into the oil. There is no outward escape from this pipe through the side of the still; therefore all the superheated steam which is carried into the still is injected directly into the body of the oil in the same manner as it is injected into the body of fat in Gilbee's case, before referred to. In this apparatus of Tweddle's no superheating furnace is shown or described, but it is stated that the steam is superheated in any ordinary way, which was commonly to take the steam in pipes through the chimney of the furnace of the steam generator which supplied the steam to be superheated, or, at all events, to superheat it by the heat of the same fire that was used to generate the steam. There is no independent superheating furnace described in Tweddle's patent; that is a furnace like that described in the plaintiff's patent, in which the steam is superheated by a fire separate and distinct from that used under the steam boiler which furnishes the steam.

The only description which Tweddle gives of the manner
110 in which he intends to superheat the steam is contained in the
first sentence of the third paragraph from the bottom of the
right-hand column of page 2 of the printed specification of the patent in the following words: "The steam may be superheated in any ordinary manner." The defendant's expert, Wilhelm, in his testimony on this point, assumes that this statement implies an independent superheating furnace—that is, one separate and distinct from the furnace of the steam generator. I cannot agree with him in this opinion, because the ordinary manner of superheating steam at the date of the patent in question was by passing it through the chimney or furnace of the steam generator itself, as shown in a

number of the defendant's exhibits—the patent of Kelly & Tate, June, 1861, Exhibit "D;" the patent of Bassett, July, 1862, Exhibit "W," and Newton, Exhibit "U," for instance. Tweddle does not say that the aim of his invention is to keep the steam pressure as low as possible; he points out the practical objections to the use of steam at 200 pounds pressure to the square inch. He then says he uses 120 pounds pressure, being actually greater than is ordinarily employed in practice by steam users. As the Tweddle patent does not describe an independent furnace for superheating the steam, I am clearly of the opinion that it does not embody the combination of parts mentioned in the seventh claim of the Everest patent.

I find that the defendant's witness, Wilhelm, is again mistaken in his reference to Exhibit "J," which is the patent of Horner, January 25, 1859. He says this exhibit "shows a superheating furnace in combination with an oil still." The specification states that the patentee "has invented a new and useful improvement in the process of extracting oil from coal, shale, and other minerals," and the specification describes an apparatus which could not be used successfully for the distillation of petroleum oils, which, in fact, were unknown commercially at the date of the Horner patent. Exhibit "J" furthermore does not show or describe any vacuum apparatus,
111 and therefore does not anticipate the seventh claim of the
Everest patent.

Defendant's Exhibit "D," patent of Kelly & Tait, June 18, 1861, "is not a vacuum still," and there is no independent superheating furnace mentioned in it.

In defendant's Exhibit "O," patent to Ewing, July 31, 1866, there is shown a vacuum still, into which a steam pipe enters which is coiled around and opens into a steam jacket below. The specification simply states that the patentee prefers to use superheated steam, but no independent superheating furnace is shown or described, and no means are referred to at all for superheating. This exhibit does not show the combination of the seventh claim of plaintiff's patent, and therefore does not anticipate it.

Adjourned, by consent, to Thursday, January 31, 1884, at 10 o'clock a. m.

January 31, 1884—10 a. m.

Same appearances.

Adjourned, by consent, to February 6, 1884, at 10 a. m.

February 6, 1884—10 a. m.

Same appearances.

Witness Osgood continues:

9. Q. Please compare the invention contained in the eighth claim of the Everest patent with the invention set forth in the defendant's exhibits and state your opinion as to the construction and novelty of the said claim, giving your reasons for such opinion.

A. The eighth claim is similar to the seventh, except that it is confined to the construction of the superheater and steam generator. This construction is particularly indicated and set forth in the state-

ment of the nature of the invention at the commencement of
112 the specifications, in the paragraph commencing at the bottom
of the second column of page 1 of the printed copy and
ending in the top of page 2, in the following language: "Also in constructing said independent superheater for steam alongside of a boiler in such a manner that the same fire used in the superheating furnace is conducted through a flue space at the rear of the boiler, and thence passing through the tubes of the boiler assists in generating steam, and thus economizing the use of fuel and increasing the effective capacity of the distilling apparatus." This eighth claim, therefore, is to the particular construction and arrangement of the superheating furnace and steam generator in connection with the vacuum still, viz., lying alongside of each other so that the hot gases from the superheating furnace pass through a flue at the rear end and assist in the generation of steam after having done their work in superheating the steam. By this means great economy is secured in the application of the heat, which is made to first superheat the steam in the pipes which pass through the superheater and then assist in generating the steam by passing through the flues of the steam generator.

I think that the defendant's expert, Mr. Wilhelm, is again clearly in error in stating that the elements of the eighth claim are the same as those expressed in the seventh claim. Mr. Wilhelm has entirely overlooked the passage in the statement of the nature of the invention at the commencement of the specification which I have quoted, and which is divided into twelve paragraphs corresponding with the first twelve claims, and which passage renders it entirely certain that the patentee included in the eighth claim as an element thereof the connecting flue at the rear end of the two furnaces.

The ninth claim relates simply to the construction of the superheater with numerous sections of small straight pipe for the passage of the steam, so that ordinary gas pipe can be used in place of the
ordinary coils, and it is evident to my mind that the eighth
113 claim can have no connection with this, in view of the paragraph I have quoted relating to the nature of the invention.

Adjourned to 2 p. m.

SAME DAY, 2 p. m.

Same appearances.

Mr. OSGOOD continues:

I do not find the construction embodied in the eighth claim of complainant's patent in any of the defendant's exhibits.

Exhibit U, Newton's patent, is a superheating apparatus for steam engines. A steam chamber is used, having a partition which divides it into two compartments. Straight pipes are used, resting one inside of the other, the inner pipes opening into the outer compartment, and the outer pipes opening into the inner compartment, by which means the circulation of the steam is made from one compartment to the other through the pipes. A casing surrounds the pipes and the steam chamber, and this casing is interposed between the furnace flue and the chimney, so that the steam is superheated simply by the passage of the draft from the furnace into the chimney.

I see nothing in this construction that has the remotest resemblance to that covered by complainant's eighth claim.

From examining the drawing marked Defendant's Exhibit "V" I am unable to understand the construction without the specification. It is apparent, however, that but a single furnace is used, which heats the two retorts; also the boiler above. The same furnace also heats the superheating pipe. This construction is different from that in complainant's case. I am also unable to understand the construction and arrangement of the apparatus in Exhibit "W" without the specification. Assuming, however, that it shows the combination of retorts with a steam boiler and a superheater, it is evident that but a single furnace is used for applying heat
114 to the retorts and for superheating the steam, and in such
case the heat is first applied to the retorts, and is then expended upon the superheating pipe by passing downward instead of being first used to superheat the steam and then to be exhausted into the steam generator, as in complainant's case. No means are shown in this drawing for discharging the draft after superheating the pipes. I find nothing in this case which shows the construction embraced in complainant's eighth claim.

Exhibit "X" shows a superheating furnace through which passes a coil of steam pipe for conveying steam which is superheated in passing through the furnace, and then is simply discharged into the retort for the purpose of extracting the volatile matter from coal and similar products. The fire simply acts upon the superheating pipes and the heat then escapes from the furnace in the ordinary way. It is not utilized as in complainant's apparatus by passing through the steam generator for the purpose of assisting in generating the steam. There is no such combination of parts as is embodied in the eighth claim of complainant's patent.

The same reasons as above apply in considering Defendant's Exhibit "Y." It is an apparatus for making fat acids. A superheating furnace is used, through which pass coils of pipe for superheating steam, which is then injected into the stills which hold the fats. The heat and products of combustion escape from the furnace in the usual way, and are not utilized for assisting in the generating of steam by passing through a steam generator as in complainant's case.

The novelty in the eighth claim of complainant's patent, as I look at it, consists in a combination with a vacuum still in which the distilling action is produced by superheated steam, of an independent superheating furnace, and an independent steam generator lying alongside of each other, with a flue connection between the furnaces, so that the heat in the superheating furnace is first applied for superheating the steam and is then applied for assisting
115 in generating the steam. No such combination of parts pro-
ducing such an effect as above described is shown in any of defendant's exhibits, so far as I can ascertain.

Adjourned to February 7, 1884, at 10 a. m.

FEBRUARY 7, 1884, at 10 a. m.

Same appearances.

Adjourned to Tuesday, February 12, 1884, at 10 a. m.

TUESDAY, *February* 12, 1884, at 10 a. m.

Same appearances.

Adjourned to Wednesday, March 5, 1884, at 10 a. m.

WEDNESDAY, *March* 5, 1884, at 10 a. m.

Same appearances.

Adjourned to Monday, March 24, 1884, at 10 a. m.

MONDAY, *March* 24, 1884, at 10 a. m.

Same appearances.

Adjourned to Tuesday, April 15, 1884, at 10 a. m.

TUESDAY, *April* 15, 1884, at 10 a. m.

Same appearances.

Adjourned to Monday, April 21, 1884, at 10 a. m.

116 MONDAY, *April* 21, at 10 a. m.

Plaintiff appears by T. G. Outerbridge, Esq., solicitor, and Geo. B. Selden, Esq., of counsel.

Defendant appears by James A. Allen, Esq., of counsel.

By consent of counsel an adjournment was had to 2 o'clock p. m.

MONDAY, *April* 21, at 2 p. m.

Plaintiff appears by T. G. Outerbridge, Esq., solicitor, and Geo. B. Selden, of counsel.

Defendant appears by James A. Allen, Esq., of counsel.

Cross-examination of complainant's witness, RUFUS F. OSGOOD, by defendant's counsel, JAMES A. ALLEN:

10 Q. You find, do you not, that prior to the complainant's patent No. 68426, on which this suit is brought, horizontal stills of cylindrical form for distilling petroleum were old?

A. Yes, sir.

11 Q. You find, also, that such retorts were old, used in connection with a vacuum pump, or other means of exhausting the air?

A. Yes, sir; I think so.

12 Q. Condensers were used, were they not, in connection with all such stills and, in fact, all stills?

A. Yes, sir.

13 Q. And every still, also, must necessarily have a goose-neck from the retort to the condenser?

A. Yes, sir; or some equivalent.

14 Q. Do you understand that when, prior to the complainant's patent, the combination of a horizontal cylindrical retort for petroleum with a goose-neck, a condenser, and an air pump was well known the mere duplication or triplication of the goose-neck used in said combination would be a proper subject-matter of invention and patentable as such?

A. I think that would depend entirely upon whether there was any difference in the effect produced. If it was a mere aggregation, producing no difference in effect, but only increasing capacity, 117 I do not think it would be patentable; but if it produced some special and different effect I think it would be patentable.

15 Q. Assume that the effect with respect to each added goose-neck is the same in its general character and of no other kind than is produced in the use of the original one, would you then say that the adding the second goose-neck would give novelty to the combination in a patentable sense?

Objected to as an assumption not warranted by the evidence in this case.

A. I don't think that alone would be patentable.

16 Q. In a horizontal cylindrical retort for petroleum the use of a series of goose-necks was known and practiced, was it not, prior to the invention of the complainant's patentee, Everest?

A. Such is shown in the patent of Reese, May 19, 1863, Defendant's Exhibit A; but in that case (defendant's counsel objects to any further statement by the witness, as the question put has been fully answered) each goose-neck connects with a separate chamber in the cylinder, which is distinct and independent of the other chambers, and it only acts upon its own chamber.

Defendant's counsel moves to strike out the last part of the above answer as being an unnecessary repetition of the witness on the direct examination.

17 Q. Prior to Everest's invention you had all the elements in use in combination which are contained in the third claim, with the exception of the duplicated goose-necks, and these duplicated goose-necks were shown in a combination with retorts and condenser, which does not appear to have included the vacuum pump; is not this so?

A. I think the individual elements were all old and that the only novelty was in the special combination of parts embodying the series of goose-necks; so far as I know, the combination was new.

18 Q. Suppose that a vacuum pump were added to the arrangement shown in the Reese patent, Exhibit A, in that case, in 118 your opinion, would there be invention or novelty in the combination stated in claim 3 of the complainant's patent?

A. I think there would be.

19 Q. Suppose further modification were made of the device shown in the Reese patent, of taking away the partial partitions between the different sections of the retort, how would you then answer the question?

A. I think it would still be patentable.

20 Q. Upon what ground?

A. The first and most important thing is a vacuum still; the second is the application of steam heat in counter-distinction to the direct application of fire in producing the distillation. In order to cover a large surface with steam pipes it is necessary to make a large still or one which covers considerable extent, so that the oil will lie in a thin body over the steam pipes. In such a still a single goose-neck is not sufficient to pass off the vapor readily, hence the necessity of a series of goose-necks. A difference in effect is thus produced which is not an aggregation.

21 Q. Am I to understand you, then, that claim 3 includes the steam pipes as an element of the combination therein named?

A. No, sir; not as an individual feature, but it is requisite that the steam pipes or some equivalent must be used to make the arrangement operative. It is not necessary that a claim to a combination should embody every essential thing necessary to make a working arrangement.

22 Q. In your opinion, could claim 3 be infringed by a retort which had no steam pipes in connection with it?

A. I think it might be.

23 Q. Explain how that could be, consistently with your previous statement.

A. By using some equivalent in the place of steam pipes for conveying the steam through the retort.

24 Q. My question was designed to assume that steam was not used. Assuming this to be the case, how would you answer my question?

A. I think it would not be infringed.

119 25 Q. In your opinion, then, if a retort with a duplication of goose-necks with a condenser and vacuum pump were used in combination and external heat, as by a fire, was used this claim would not be infringed, steam heating not being employed?

A. I have my doubts in regard to that. The combination of mechanical parts would be the same; the effect of the goose-necks in carrying off the vapor would be the same; therefore the mechanical results would be the same, and the only difference would be, so far as these features are concerned, in the method of applying the heat, and the application of heat by direct fire might be the equivalent of passing steam through the pipes.

26 Q. Suppose, then, in the use of the combination stated in the last question partitions were made between different divisions of the retort, such as are described in the Reese patent; would then, in your opinion, the combination infringe claim 3?

A. I think not.

27 Q. Solely by reason of the partitions?

A. I think principally by that reason.

28 Q. And you think that taking out the partitions such combination would infringe?

A. I think so.

29 Q. What different effect in the operation of the combination is there whether the partitions are out or in?

A. If the partitions are in there are as many chambers in the retort as there are goose-necks, and each goose-neck would only draw from its own chamber. There may be an inequality in the draft through the several goose-necks, so that while one produces a perfect exhaust the next may be imperfect. There may also be an inequality in the heat under or in the several chambers, producing more vapor in one than in the other and causing an unequal discharge. By making the whole retort in one chamber and drawing from the goose-necks over this whole chamber the draught is regular and even and the vapor will be readily taken away. There is also much less tendency to draw the oil over from the retort if one large chamber is used than if several small ones are used, in 120 which case, if any sudden impulse is given to the exhaust or if more exhaust occurs in one goose-neck than another, the oil will be likely to be drawn over, because the exhaust acts upon it with greater power.

30 Q. Are these views expressed in the preceding answer the result of any actual observation of any such apparatus as is considered in the answer?

A. No, sir.

31 Q. It is simply theoretical reasoning with you, is it not, wholly unsupported by actual observation?

A. Yes, sir.

32 Q. Assume that the device shown in the Reese patent had been used in connection with an air pump for purpose of vacuum distillation, would it, in your opinion, constitute an invention to remove the partitions between the different divisions of the retort?

A. I think it would.

33 Q. In the case supposed of the duplicate goose-necks of the Reese patent being used with a vacuum pump, the partitions being left in, would not the exhaust be distributed in the retort and the escape of the vapor at the same time facilitated?

A. The exhaust will be extended to different parts of the retort, but will act only in the separate chambers in the same manner that several goose-necks would exhaust from just as many separate retorts as there were goose-necks, each independent of the other. This I would regard simply as an aggregation of several goose-necks and several retorts instead of one, and having no difference in effect over a single retort with a single goose-neck.

34 Q. And you think that such an aggregation would be in principle distinguishable from the same relative arrangement of retort, goose-necks, condenser, and vacuum pump, without any use of partitions to divide up the space in the still into separate chambers for the action therein of the exhaust through the goose-necks?

A. Yes, sir; I think one is a mere aggregation and the other is a patentable novelty.

121 35 Q. Where you say in part of your answer to question 5 that pipes *p p* in the Gengenber patent, Defendant's Exhibit G, form but a single discharge for the gas and but a single goose-neck that they could not equalize the action upon all parts of the retort, have you taken into account the statement made on page 4 of the Gengenber specifications, as follows: "The tower retort '*g*' has two or more exits, *p p*, at different points to equalize the discharge of the volatile products and allow them to pass off without remaining longer than necessary exposed to the heat of the retort?"

A. Yes, sir; I suppose the meaning of the inventor is that by using two points of discharge at some distance from each other the tendency to equalize will be greater than if there were but a single point of discharge. But the discharge is not equalized for this reason, that the lower branch tube, "*p*," has a shorter and more direct passage to the point of discharge than the upper one has; therefore the draught would be greater through the lower branch tube than through the upper one, and the action would not be equal.

36 Q. If Gengenber's specification correctly states the use of the two or more exit pipes, *p p*, the effect they have is acting together at the same time to pass over to the receiver "*r*" the products of distillation, is it not?

A. I think so.

37 Q. You have here, then, two operative goose-necks or exit pipes discharging the distilled products from the retort at the same time into the condenser, a pump being also in action by means of an exhaust through the condensing pipes and passages and goose-necks to the vapor space of the retort?

A. That is true, except that I should say it was more properly a single goose-neck with two branches than two goose-necks.

38 Q. The object of Gengenber's apparatus is the production of oil, is it not?

A. The statement of his invention is that a new and useful improvement in apparatus for the destructive distillation of oleiferous
minerals, such as shale, bituminous slates, cannel coal, for the
122 purpose of extracting therefrom oils and tars; I suppose the
object is to extract the oil and tar from the mineral.

39 Q. The product realized by this apparatus is analogous or similar to that realized from a petroleum still, is it not?

A. Well, no; I think it is of the same general nature, but in crude form corresponding with crude petroleum, and I suppose requiring another distillation to refine it. I don't know this of my own knowledge, but suppose it to be the case.

40 Q. Now, the vapors which are present in the vapor space of the retort "*g*" must be similar, must they not, to those which are present in the vapor space of a petroleum still?

A. I should suppose so.

41 Q. The differences between this apparatus and one for the distillation of crude petroleum relate mainly, do they not, to the fact that the oleiferous material made use of for the purpose of distillation is in the solid and not in the liquid form?

A. The differences in use necessarily require a difference in construction. I think the two are totally unlike. Neither one could be used for the purpose the other is.

42 Q. But this apparatus could be used for the distillation of petroleum, could it not, by substituting a tank or vat or common retort in the place of the lower part of the V-shaped retort which it now has?

A. I think not without making other changes.

43 Q. What other changes would be necessary beyond properly connecting the pipe *d'*?

A. I think it would be necessary to dispense with the pipe *d′*; also to dispense with the charging boxes *b* and *b′*, covering the top of the tower G. I think, in fact, that such changes would have to be made as would reduce the apparatus to a common still.

44 Q. The charging boxes could be left at the top of the tower as they are, could they not, without being used?

A. They might if closed and packed tight enough to prevent the admission of air.

123 45 Q. If the change were to a petroleum still it would be necessary, would it, to disconnect the pipe *d′* so as not to connect back to the retort?

A. I think so, or cut off the passage through it.

46 Q. Assume that the Gengenber apparatus was invented and used before the discovery of petroleum, and that after such discovery it was desired to adapt the apparatus to the distillation of petroleum. In your opinion, would it require invention to substitute a common horizontal retort in place of the lower part of the retort with its crusher attachment and to disconnect the pipe *d′*, leaving the rest of the apparatus as it appears in the specification and drawing?

A. No, sir.

47 Q. Would the required changes be such as would be obvious to a competent mechanic called on to adapt the apparatus for use in the one distillation instead of the others?

A. I think so.

48 Q. This apparatus would then show to a mechanic or other person the combination of a retort with two or more exit pipes leading therefrom, a series of condensers, and an exhaust pump at the end opposite to the retort, the purpose and use of the combination being the production of distilled oil?

A. I think it would show it all except that there is but one main exit pipe from the retort. It would also be necessary in making an operative apparatus to form some sort of an exit at the air pump for the discharge of the gases or the oil and a receptacle to receive them. I think also that the double goose-necks *t* and *w* between the tank "*r*" and the pump would be inoperative in distilling oil with a tight retort for the reason that the gas would be condensed in the refrigerator "*v*" and this oil would not be drawn over through the second goose-neck "*w*" to the pump; therefore, to make an operative apparatus, I think the goose-neck "*w*" and the washer "*z*" would have to be dispensed with. If the oily vapor were brought
in open contact with the water in "*z*" it would condense and
124 mix with the water and would have to be drawn off and
separated, and no means is shown for that. As stated in the specification of Gengenber, the tar is deposited in the main tank "*r*" and the condensable vapor is separated from the permanent gas in the refrigerating system "*v*." The permanent gas then passes through the pipe "*w*" and into the washing vessel "*x*," where, as I understand it, it is purified in the same manner that illuminating gas is, and from this point it is drawn through the pump and forced back through the pipe "*d′*." He speaks of this gas as a permanent gas. None of the oil or tar, as I understand, is drawn back of the

tank "*r*." I take it in such a still, if used as a petroleum still, the oil could not be drawn back farther than the refrigerator "*v*," and this would require a reconstruction of the whole still to adapt it to their use.

49 Q. There is ample means of discharge provided, is there not, for the oil or tar from the tank "*r*" and the connected refrigerator "*v*?"

A. I cannot say, for I do not know the size of the tank nor the size of the discharge.

50 Q. Assuming them to be, what a good mechanic might be supposed to make them, sufficient.

A. In an oil still I don't think the vapor would condense in the tank "*r*." Therefore there would be no need of a discharge at that point, but the vapor would be carried over in the pipe "*t*" and through the refrigerator "*v*," and would be condensed in the coils of pipe in the refrigerator, and would have to be drawn off in the trap *s′*. A receiver would have to be connected with this trap to contain the oil, which is not shown in this patent. I cannot state whether the trap "*s′*" would be a sufficient discharge or not.

51 Q. Taking it for granted that the discharges at *s* and *s′* and the receiver in connection therewith are sufficient in capacity, what is there about this apparatus when the changes named in question 46 are made to leave it in the least inoperative as an apparatus for
distilling petroleum, it being assumed that a proper exit and
125 receptacle are made at this air pump for the discharge of
gases?

A. It would be necessary to substitute a tight retort in place of that shown in this drawing, to dispense with the trap "*s*," or to put a cock therein, to dispense with the pipe *d′*, to enlarge the trap *s′* to the capacity of the coils of pipe which pass through the refrigerator, to connect with the trap *s′* an air-tight receiver, and to connect with the air pump an air discharge below the piston with a valve therein, and to dispense with the safety valve "*b′*."

Adjourned, subject to further notice.

SATURDAY, *May* 17*th*, 1884—10 a. m.

Met pursuant to agreement.

Present: T. G. Outerbridge, Esq., solicitor for complainant, and Geo. B. Selden, Esq., of counsel, James A. Allen, Esq., of counsel, for defendant.

Cross-examination of witness, R. F. OSGOOD, resumed by MR. ALLEN:

52 Q. Referring to the answer which you gave to the 5th question on your direct examination, in which you specify that the goose-necks extend in parallel lines from the retort to the condensers, do you wish to be understood as giving your opinion that the third claim of the complainant's patent is limited to an arrangement of goose-necks in parallel lines with each other?

A. No, sir.

53 Q. Would, in your opinion, the subject-matter of that claim be anticipated by a combination of the same elements specified in the claim in which, however, the goose-necks were shown running in opposite directions or otherwise than parallel with each other?

A. I think so.

54 Q. You put, then, no stress under this claim in any way on the direction from the retort in which the several goose-necks are made to run to join their several condensers?

A. No, sir; I think it makes no difference whether they extend parallel to each other or at an angle.

126 55 Q. I notice also in your answer to the fifth question upon the direct examination you state as among the essential features of this third claim, "First, a horizontal and elongated retort, which allows the oil to be spread over considerable surface to receive the best action of the heat, which is desirable where steam is applied, as is done in this apparatus." Do you wish to be understood as testifying that the combination named in this claim is limited to the case in which a retort or retorts are used of the description specified in the language above quoted—*i. e.*, horizontal and elongated?

A. No, sir; I mean a retort of such size as to present a large surface for the oil to lie in a thin body over the heating pipes.

56 Q. Is there any limitation made in this claim whatever of any kind with respect to the size or form of the retort or retorts?

Objected to as immaterial.

A. Not in the claim itself, but construed in connection with the specification I think it is limited in the manner I have described.

57 Q. Upon what language of the claim do you base this construction?

A. From no particular language in the claim, but from the fact that it is stated in the claim that two or more goose-necks are to be used to distribute the exhaust in the retort, and I understand in the specification that the retort is a horizontal elongated cylindrical or elliptical vacuum retort or any other form that will answer the desired purpose. I can see no object in attaching two or more goose-necks to the ordinary upright form of still, but I can see an object in attaching them to such a retort as is described in the specifications; therefore I think the claim embodies the kind of retort that is described in the retort.

58 Q. When the claim uses broadly this language, "connecting the retorts of a vacuum still with the condenser or condensers by two or more goose-necks," what authority have you for saying
127 that "the retorts of a vacuum still" mean only a particular description of retort not mentioned or referred to in the claim?

A. Because a particular kind of retort is described in the specification, and because the second claim claims such a retort, and because two or more goose-necks are particularly applicable to a retort of this kind, and not to an ordinary retort.

59 Q. Assuming that the third claim is not limited to a particular shape of the still, but covers broadly any form of still with which

duplicate goose-necks are used, do you find in that case that the third claim is anticipated by one or more of the exhibits produced by the defendant and referred to on your direct examination?

A. No; I think not.

60 Q. How do you distinguish Exhibit "Q?"

A. In Exhibit "Q," as I understand, the two goose-necks and condensers are on opposite sides of the still; are to be used alternately, so that while one is in active operation the other is inactive; and so, in fact, the retort is used with but one goose-neck, and not with two or more acting at the same time, as in complainant's case.

61 Q. How are you able to make the statement in your last preceding answer when the specification itself states on the third page "the whole number of condensers may be made to bear at any time upon a single still or the whole may be made to act on all the stills," and the employment of two or more condensers is stated to be alternately if desired?

A. The passage in the specification is obscure, and I am unable to understand exactly what is meant, but it states "where a series of stills are employed a series of condensers may be employed with them, connected together." The inference is that the condensers are connected together, and the passage then states that the whole number of condensers may be made to bear at any time upon a single still or the whole may be made to act on all the stills. I should think the meaning of this is that the condensers can be made
128 to act through one goose-neck on a single still or through several goose-necks on all the stills. This looks reasonable, because the inventor speaks of a series of stills, and says that a less proportional number of condensers may be employed, and makes no mention of more than one goose-neck to each condenser.

62 Q. Suppose that an air pump were connected with the two condensers, as specified in the second paragraph of page two of this specification, what would prevent both goose-necks and condensers operating at the same time?

A. I should construe that paragraph to mean that a separate air pump might be connected with each condenser, in which case but one would exhaust at a time. This, I think, is a fair construction, because it is followed in the same connection in the description by the explanation of another means of producing the exhaust "by the admission of steam from the pipes M N, acting on the same principle of the water exhaustion above described." If a separate pump were used for each condenser the exhaust would be through only a single goose-neck when one pump was used at a time.

63 Q. When the exhaust is made by admitting steam what is to hinder its being made simultaneously upon both condensers if the operator desires to do so?

A. It could be done by opening both of the cocks "*i i*."

64 Q. Am I to understand it as your opinion from this specification that it was never supposed by the patentee that at any time or for any cause it would be found desirable to operate the device shown by both condensers and both goose-necks?

A. I am not competent to say as to that. I made out the specification of this patent, "Exhibit Q," and I know that the object then, as stated to me——

(Mr. Allen here objects to what the witness is about to state as voluntary and irrelevant and not called for by the question.)

—by the applicant, was to make a continuous exhaust in the still by an alternate action.

Recess till 1.15 p. m.

129 MAY 17TH—1.15 p. m.

Same appearances.

Cross-examination of witness OSGOOD continued:

65 Q. If in this device of Ewing's the two condensers and two goose-necks were used together the escape of the vapor would be facilitated, would it not, by the duplication?

A. I think it would to a certain extent, although, owing to the shape of the retort, I think the single goose-neck would be effective if made of proper size.

66 Q. If the two condensers and goose-necks were connected with a single pump the exhaust would be distributed in the retort to a greater extent than if but one of the goose-necks was used?

A. That is so, unless the single goose-neck was made very large at its base.

67 Q. Is there any specification in claim three of complainant's patent that the two or more goose-necks should be connected to the retort at any given distance apart?

A. I think not.

68 Q. You speak in your answer to the fifth question on direct examination of the "separate condensers being arranged in a line parallel with the retort." Is any such feature made a part of this claim?

A. I think not.

69 Q. Is there any designation in this claim of the condensers, whether "jet condensers" or "worm condensers," and would either kind be within the claim?

A. The specification shows and describes a worm condenser, but not a jet condenser. I think the claim would cover either.

70 Q. Do you understand the specification of the complainant's patent sufficiently to make a drawing of any portion of the device as it would be found when actually constructed and in operation?

A. I think not without further practical knowledge of the art or without instruction from some practical operator. I suppose you mean working drawings.

71 Q. Are there portions of the apparatus necessary to be
130 constructed in order to render the device operative which are
entirely omitted to be described in this patent, either in the specification or the drawings?

A. I presume there are. I have never known a drawing of a patent to be a working drawing, showing all the parts used in the machine.

72 Q. I am not speaking of working drawings. Can you give me any kind of a rough sketch that will show what the intention of the patentee was with reference to the mode of connecting the capacious condensers with the worms marked "E E′?"

A. Not any more clearly than is indicated in the drawings of the patent. I can give you a sketch of how I would make it myself, but I cannot say what was the intention of the inventor in that respect.

73 Q. Please make a rough sketch indicating the best you can your idea of what this mode of connection was intended to be.

(Witness makes drawing and hands it to defendant's counsel.)

Same offered in evidence by defendant's counsel and marked "Defendant's Exhibit Z, Osgood Sketch."

74 Q. This sketch, as I understand it, exhibits only the worm connection with the series of capacious condensers, as shown in Fig. 3 of the drawings of the Everest patent. Will you please add to the same sketch another figure showing the connection with the worm when there is only one capacious condenser for the three goose-necks, as shown in Fig. 5 of the Everest drawings?

(Witness adds same.)

75 Q. What authority do you find in the specification for the three pipes with which in Fig. 2 of your sketch you connect the condenser C′ with the worm E′?

A. In this sketch I have simply shown my own plan of connecting the pipes. I cannot say exactly what plan was followed by the inventor. Fig. 1 of his drawings is the only figure which shows the worm E′, and this is a cross-section which cuts off a portion of
the condensers and the worm, so that the connection between
131 the condensers and the worm of that portion which is cut off
is not shown, but that portion which remains shows one of the condensers and a vertical pipe leading from the bottom of it and connecting with the worm in a manner similar to what I have marked in "Exhibit Z." I would say that Exhibit Z shows a view at right angles to that shown in figure one of complainant's patent, so as to exhibit all three of the condensers C′ and their connection with the worm. The only reference I find in the specification is in the middle of page 2 of the printed patent, where it says "with the bottom of the series of condensers connect two separate condensing coils of pipe, E E′, resting in the water tank D′, and these coils passing out through the tank connect, respectively, with the receivers F F′ for retaining the distilled oils;" and further on the specification says "when the exhaust is applied it will be seen that it operates to produce a vacuum from the receivers clear back to the retorts through the parts E E′, C C′, and B B′." From this it is apparent that the condensing coils E E′ must be connected with the condensers C C′ in such a manner as to exhaust through all of them.

76 Q. The sum of the matter is, then, is it not, that, beyond showing that the worm is connected with the condensers C′ C′, there is no showing or description, either in the drawings or specification, of

the form of the arrangement of the pipes by which that connection is made?

A. I think it is shown in the drawing, cross-section, Fig. 1, but I find no specific description of the particular method of attachment in the specification.

77. It is not possible, is it, for the cross-section in Fig. 1 of the patent to show what appears by Fig. 1 of your sketch?

A. No, sir; not in the same form, but I think a cross-section of my sketch, "Exhibit Z," would show substantially what is shown in the drawing of the patent, Fig. 1.

78 Q. Consistently with this same cross-section there might be various arrangements of the pipes, might there not, as shown in longitudinal section?

132 A. There might be in the way of coiling the main length of the pipe, but I can conceive no way of connecting the coils with the condensers except by branch pipes running up to the condensers from the coils, in which case they would show as they do in the cross-section, Fig. 1, of the patent.

79 Q. So your answer is that there must necessarily be a cross-pipe from the top length of the worm to each one of the condensers C′, and that the construction could not be otherwise?

A. There is only one other way that I can see now, and that is to provide each condenser, C′, with a separate coil of its own and uniting all these coils at the end in a common discharge pipe which passes out through the side of the water box and connects with the receiver, as described in the patent.

80 Q. That is shown not to be the construction by the cross-section in Fig. 1 of the patent, is it not?

A. I think that to be true.

81. So that variation would not be authorized. Can there be any other?

A. I cannot see any other. The cross-pipes might be made so short as merely to form connection without having any considerable length, the coils being located close up to the condensers.

Adjourned to Wednesday, May 21, 1884, at 10 a. m.

WEDNESDAY, *May* 21, 1884—10 a. m.

Present: T. G. Outerbridge, complainant's solicitor; Geo. B. Selden, Esq., of counsel; James A. Allen, Esq., of counsel for defendant, not appearing.

At Mr. Allen's suggestion, by letter, the case was adjourned to Friday, May 23, 1884, at 10 a. m.

133 FRIDAY, *May* 23, 1884—10 a. m.

Present: T. G. Outerbridge, Esq., for complainant; James A. Allen, Esq., for defendant.

Cross-examination of Mr. OSGOOD continued:

82 Q. What is there in the specification or drawings of complainant's patents which prevent attaching the worm or a pipe leading

to the worm at the end of the horizontal condenser marked C′ in Fig. 5?

A. There is nothing to prevent it.

83 Q. Is there any means of saying that that was not the patentee's intention?

A. I think not, so far as the form shown in Fig. 5 is concerned.

84 Q. Suppose that were the construction, would the exhaust from the pump act equally on the three goose-necks, B′?

A. I think if the chamber C′ was made large so that the exhaust acted upon a large body the drawing action through the pipes B B′ would be substantially equal, although the tendency would be to draw most through that pipe, B′, which is nearest to the worm in the end of the condenser.

85 Q. Suppose the proportion were as shown in Fig. 5?

A. I think that would depend a good deal upon the size of the worm attached to the end of the condenser. If the worm was as small as that shown in Fig. 1 of the patent I think the action would be substantially equal through all the pipes B′.

86 Q. Do you give it as your professional opinion that with the arrangement of pipes connecting with the worm shown in Fig. 2 of your sketch marked "Exhibit Z" in the actual operation of the device there would be a substantially equal distribution of the exhaust through each of the three goose-necks marked B′?

A. Yes, sir.

87 Q. Would there be an equal distribution through the three pipes from the condenser to the worm?

A. I think not.

134 88 Q. Upon what theory, then, do you affirm that the exhaust would be equally distributed through the three goose-necks?

A. The condenser C′ is of such size that the exhaust acts gradually upon the amount of vapor which it contains; in other words, it breaks the active force of the exhaust throughout its whole length, and this slow exhaust in the condenser has the tendency to draw equally or substantially equally upon all of the pipes B B′.

89 Q. Your exposition in reference to Fig. 2 of your sketch demonstrates fully, does it not, that through the three goose-necks B B′, in Fig. 1 of your said sketch, the exhaust would be unequal, and that the main exhaust would be through the connecting pipe nearer the pump, and through the goose-neck B′, which is in immediate connection therewith?

A. In Fig. 1, the same as in Fig. 2, a condenser, C′, is used which breaks the force of the exhaust, between the worm and the goose-necks B′ above. There might be a tendency to be a greater exhaust upon the first condenser than those farther beyond.

90 Q. In Fig. 1 of said sketch, as you have already said, the greater draught would be through the pipe marked "1." For a like reason the exhaust would be more strong through the pipe marked "2" than through the pipe marked "3," would it not?

A. I think that would be the tendency.

91 Q. Now, in Fig. 1, would it be possible to be otherwise than

that the same inequalities in the strength of the exhaust through the pipes marked 1, 2 and 3, respectively, would be found in the several goose-necks marked B′, connected respectively with said pipes 1, 2 and 3?

A. I think there would be an inequality, but in a less degree of force than through the pipes 1, 2, 3, because the capacity of the condensers C′ and the goose-necks B′ is much greater than that of the pipes 1, 2, 3, so that while the force of the draught through the pipes 1, 2, 3, might be great, that through the condensers the goose-necks would be more positively reliable. Therefore,
135 while there might be an inequality of the drawing power of the goose-necks upon the retort, I do not think it would be very great.

92 Q. In the continuous working of the air pump, would not the whole force of the exhaust through the pipe 1 necessarily be found acting through the goose-neck B′ connected therewith?

A. I would say the whole force acts, but in a less degree, or with less power in the goose-neck than in the pipe 1.

93 Q. You mean the exhaust through the goose-necks would be more uniform and less closely timed to the action of the pump, do you not—*i. e.*, timed to the motion of the piston?

A. Yes; I mean that, and also that there is less force and velocity to the current in the goose-neck than in the pipe 1, because the latter is of small size, and in order to pass a given quantity of vapor the vapor must receive a quicker movement through the pipe 1 than through the goose-neck.

94 Q. The same proportion in the strength of the exhaust through the pipes 1 and 2 would appear in the goose-necks B B′ connected therewith, respectively, would it not?

A. I think so, substantially.

95 Q. And the same would be true with the pipes 1, 2, and 3, and their goose-necks B′ respectively connected therewith, would it not?

A. I think so.

96 Q. Do you find anything in claim 4 of complainant's patent that specifies the size or proportions of the capacious condensers with reference to the size of the coil in the worm or the size of the goose-necks?

A. No, sir; no specific size is mentioned.

97 Q. Do you find anything of the kind in the drawings or specifications?

A. Certain sizes are shown in the drawings, but the drawings are not made to a scale; therefore these sizes may not be correct.

98 Q. Do you understand from the letters patent that the patentee in any manner restricted himself to any given form or size of the condensers C′?

136 A. I think not, except that the form shall be such as to correspond with the kind of retort used, and such sizes as will produce the working action described.

99 Q. If the same working action would be produced by the location of the condensers between the worm and the pump, would, in your opinion, such condensers be included in claim 4?

A. I should want to see how that could be done before expressing such an opinion.

100 Q. Assume that such a location of the condensers would equally well serve as a check to diminish the direct action of the exhaust pump upon the oil in the retorts, would it then, in your opinion, be within said claim?

A. The question presents an intangible idea that has no form or substance, and which I am unable to comprehend, for I cannot see how such an apparatus could be made to act.

101 Q. Suppose in a still for the distillation of petroleum the vessel marked "M," shown in Defendant's "Exhibit S," the Hamilton patent, were used between the pump and the worm, for the purpose of serving as a "check to diminish the direct action of the exhaust pump upon the oil in the retorts," would such a construction not be, in your opinion, within the language of claim 4 of complainant's patent?

A. I think not.

102 Q. Would not the vessel "M" referred to, interposed between the pump and the worm, serve as a check to diminish the direct action of the pump upon the oil in the retort?

A. I think not, effectively.

103 Q. Why would not it?

A. For several reasons: First. In my opinion, it is necessary to locate the check very near to the retort, so that it will draw the vapor at once into a capacious vessel. Second. If the check is located beyond the worm and between the worm and the pump, the condensation of the oil in the worm will more or less affect the draught through the pipe. If the check is placed above the worm, as in complainant's case, and between the worm and retort, it will not 137 be affected by such condensation. Third. If the check is placed beyond the worm, as in "Exhibit S," there is a long connection between the check "M" and the retort by small pipes, in which the current gains force as it is drawn forward, and the effect, I think, would be similar to connecting these pipes directly to the pump so that no check at all would be produced.

104 Q. Have you ever made any experiments with reference to the condensation going on in the worm affecting the regularity of the exhaust made by the action of an exhaust pump through such a worm?

A. No, sir.

105 Q. And you wish to be understood that it is your opinion that in "Exhibit S" the action of the exhaust through the worm upon the retort would not be affected or varied by the pressure of the receiver "M" between the pump and the worm?

A. I think not materially. I think the action upon the retort would be very slight indeed, if any at all, from the use of the receiver "M."

Adjourned, by consent, to 2 p. m.

FRIDAY, *May* 23, at 2 p. m.

Same appearances.

Cross-examination of Mr. OSGOOD continued:

106 Q. Before the date of the complainant's patent, enlarged vessels between the retort and condensing worms are shown to have been used, are they not, in oil stills which were not operated with the use of a vacuum pump?

A. I cannot say. I do not recall anything of that kind to mind now.

107 Q. I call your attention to the description of the prime condenser, pages 2 and 3 of the manuscript specification, Defendant's Exhibit J, Homer's patent.

A. I do not understand the construction of the prime condenser nor the coils spoken of, but if they are outside the prime condenser the condenser would be located between the coils and the retort. I suppose that is the way it is.

138 108 Q. This prime condenser is described, is it not, as an upright vessel into which the vapor passes from the retort through the pipe E, being about four feet high by two feet diameter, and from near the bottom of which a pipe passes to a worm in a cooler filled with cold water, where the oil is cooled; thence passing into a separating chamber where the oil is separated from the water and drawn off.

A. I think that is correct.

109 Q. This prime condenser, then, is a vessel of similar form and similarly located to the condensers *c c'*, in Fig's. 1 and 3 of complainant's patent?

A. Yes; so far as that is concerned, I think so.

110 Q. Such a capacious condenser, then, in and of itself was not new at the date of complainant's patent?

A. No, sir; in and of itself it is nothing but an ordinary vessel.

111 Q. Nor was there anything new in its location between the retort and the worm?

A. Not in itself, but only as combined with other parts.

112 Q. The arrangement of the capacious condenser *c c'* between the retort and the worm being old and in prior use with stills for the distillation of oil where the vacuum pump was not connected and the use of the vacuum pump in connection with oil stills being well known, would there be, in your opinion, any invention in adding the well-known device in connection with an oil still of an air pump to an apparatus for distilling oil in which the capacious condensers were on duty between the retort and worm?

A. I think so, very decidedly. The invention covers a certain and definite combination of parts arranged in a particular way. In the first place, it is necessary where a vacuum is to be produced, to have a tight still. The still shown in "Exhibit J" is not a tight still. In the next place, it is necessary to have a tight condenser, and this condenser must be located between the retort and the worm; and, in the next place, an exhaust pump must be connected with the worm outside of the condenser.

139 Objected to, all of the foregoing answer after the word "decidedly," as not required by the question.

113 Q. If oil retorts and worms were in use prior to the complainant's patent in connection with an air pump and apparatus having the capacious condensers between the retorts, and worms were also in use without the vacuum pump connected, do you think it would involve invention simply to add to the latter arrangement the air pump, making the passages all close passages without vent except through the pump?

A. I should say so; the combination would be new.

114 Q. You think that this would not be such an obvious thing as to be quite within the province of an ordinary mechanic without exercising invention?

A. I think that is so.

115 Q. And you think, also, it would involve invention notwithstanding the showing of the capacious condenser or receiver "*r*,' between the retort and the worm "*n*," which appears in the Gengember patent, Defendant's Exhibit G," where a vacuum pump is used to exhaust through the worm and connected passages to the retort?

A. Yes, sir; that is not a vacuum still and oil could not be distilled in it.

116 Q. But in this device the air pump acts as an exhaust through the worm, the vessel "*r*," and connected pipes to the retort, does it not?

A. It does.

117 Q. Will not an enlargement of the conduit at any point between the goose-necks and the pump check or equalize or steady the draught through the goose-necks upon the retort?

A. I don't think it will, effectively, unless located near the retort. I think it is necessary to produce the break or check near the point where the vapor is drawn over from the retort. If it is located a good ways off from the retort I think the current gets such a lead that the break or check will not act effectively back to the retort.

118 Q. I understand you to say in your testimony on direct
140 examination, in substance, that the superheating furnaces
shown by the defendant's exhibits to have existed prior to the complainant's patent were not independent superheating furnaces, but furnaces set in some part of the boiler stack; am I correct?

A. I think I stated in reference to a particular point that the ordinary method of superheating of that time was by passing the steam pipe through the furnace or fire back of the steam generator itself, and then cited some of the defendant's exhibits to show that construction.

119 Q. Does not Defendant's Exhibit J, the Horace patent, show an independent superheating furnace?

A. It shows the furnace or grate with the pipe running through it, but I think no mention is made of it in the specification. I presume that this is a superheating furnace. A portion of it is cut off by a section, and I can't say whether it has any other function or not. I presume, however, it was intended simply for superheating the pipe.

120 Q. It is, then, an independent superheating furnace?

A. In that case it would be.

121 Q. Does the Gilbee patent, Defendant's Exhibit K, show an independent superheating furnace?

A. I think so.

122 Q. Does the patent of Werk, Defendant's Exhibit Y, show an independent superheating furnace?

A. I think so.

123 Q. Do the drawings marked Defendant's Exhibit G show an independent superheating furnace?

A. I cannot understand the construction of this apparatus from the drawings alone, but I should think that the steam boiler is heated from the same furnace that superheats the steam.

Adjourned by consent to Saturday, May 24, at 10 a. m.

141 SATURDAY, *May* 24, 1884—10 a. m.

Same appearances.

Cross-examination of Mr. OSGOOD by Mr. ALLEN continued:

124 Q. I call your attention to the Howarth patent, Defendant's Exhibit X, and I ask you if the distilling device of this patent shows an independent superheating furnace. for superheating the steam?

A. It does.

125 Q. That is a patent for an apparatus for distilling oil from coal, is it not?

A. Yes, sir; it says in the specification for extracting the volatile products from the coal and other substances.

126 Q. It is entitled "A new and useful method of extracting the volatile products from coal and other substances yielding pyrogenous oils and gases?"

A. Yes, sir.

127 Q. The object, then, is the production of burning oils?

A. I presume so, although the specification does not state to what use the oil is to be applied.

128 Q. In the patent of Werk, Defendant's Exhibit Y, the object of the apparatus described is the distillation of fatty or oleaginous bodies, is it not?

A. I think not. The invention consists in the process of manufacturing fat acids.

129 Q. The apparatus is for the treatment of fatty or oleaginous bodies, is it not?

A. Yes, sir.

130 Q. In a retort or closed vessel with superheated steam?

A. Yes, sir.

131 Q. The oleaginous bodies are first melted and poured into the retort "D" through the cock "L," are they not?

A. Yes, sir.

132 Q. The oleaginous body, then, when received in the vessel "D" is in a liquid form?

A. I think so.

133 Q. Crude petroleum, then, would be within this description?

A. From being in a liquid state, I should say yes.

134 Q. We have, then, in Defendant's Exhibit Y the com-
142 bination of a still for petroleum or other oleaginous bodies, a
steam generator, and an independent superheating furnace
for heating the steam, have we not?

A. I think not, properly.

135 Q. Which of the elements named in my last question is absent?

A. The still.

136 Q. For what reason do you say that the closed vessel "D," described in this apparatus for the reception of oleaginous bodies to be decomposed into their constituent elements by the action of superheated steam within the vessel, is not a still?

A. In the first place, the use is not analogous. The object in Exhibit Y is to treat fats for the purpose of making fat acids and not to distill off and throw over a portion of the contents of the vessel for the purpose of producing an oil. The fats are merely placed in the retort and subjected to heat to produce a chemical reaction. So far as I can understand the specification, no distilling action is produced, and no means is shown connected with the retort "D" by which a distilling action can be produced; therefore I say there is no still.

137 Q. The Werk apparatus being desired to be applied in the reduction of petroleum oils, would it involve invention to apply an ordinary goose-neck to the top of the vessel "D" connecting with the usual condenser or worm?

A. I don't think it would be operative even when that was done. I think it would not require invention to apply the goose-neck to the top of the vessel "D."

138 Q. Why would it not be operative if with the goose-neck were added the other usual connections of an ordinary oil still?

A. Because, as I understand the construction, the superheating pipe "F" simply opens into the side of the retort "D" and allows the steam to enter in a free body at one point, and I do not think that oil could be distilled in that way.

139 Q. You have no other reason to assign than this?

143 A. No discharge or exit is shown for the steam from the
retort, so far as I can see, except a weighted valve at the top.
I will state here that I am in error as to the opening of the pipe "F" into the vessel "D." It states that it circulates within the vessel in the form of a coil, which is perforated to admit the steam in numerous small streams. I do not think it is practicable to distill oil by the injection of steam alone. I notice also on the bottom of the retort "D" what seems to be a door. I think it would be desirable to dispense with this door and also with the weighted valve at the top of the retort if it were to be used as an oil still.

140 Q. Would the presence of those features render the apparatus inoperative?

A. They might not if properly packed.

141 Q. You never made any test from which you can say that such an apparatus would not be practicable?

A. No, sir.

142 Q. In the Howarth patent, Defendant's Exhibit X, we have the combination, have we not, of a still, steam generator, and an independent superheating furnace for heating the steam?

A. I think not, properly; no steam generator is shown, and I hardly think the retort is in the nature of a still, as its object seems simply to be to hold the coal and allow the same to be subjected to heat, the liquid products running down of their own gravity into a receiver which has open communications with the outer air. If this is literally a still the specification describes the combination expressed in the question. It is evident that oil could not be distilled in such an apparatus.

Counsel objects to the last sentence of the answer as not called for by the question.

143 Q. Do you mean in your last answer that the oleaginous vapors mentioned in this patent are caused to descend to the receiver "*h*" simply by gravity?

A. By gravity and, perhaps, also by the force of the steam.

144 Q. In Tweddle's patent, Defendant's Exhibit H, the
144 coil of pipes marked F, Fig. 4, is set within the still, passing
the steam through the interior of the coil without emitting
any of it in the oil, is it not?

A. I think so.

145 Q. On the other hand, the circular and radial pipes marked E, Fig. 5, are perforated so as to emit the steam into the oil?

A. Yes, sir; that is correct.

146 Q. In the complainant's patent the pipes represented by I, Figs. 4 and 6, pass the steam through the oil within the pipes without emitting the same into the oil, do they not?

A. Yes, sir.

147 Q. On the other hand, the pipes marked H, in Fig. 4, are described in the specification as jet pipes pierced with numerous small holes for the injection of steam into the body of the oil, are they not?

A. Yes, sir.

148 Q. And each of these sets of pipe is connected with the pipe "L" proceeding from the superheater?

A. Yes, sir.

149 Q. Likewise in the Tweddle patent, Exhibit "H," the pipe "F" and the pipe "D" are both connected with the pipe from the superheater?

A. I think not.

150 Q. What does this language mean, then: "The coil F may be used for heating the oil with steam up to distilling temperature, and afterward the steam distributor "E" for carrying on the distillation, or either of them alone may be used, as may be preferred?"

A. I think it meant that common steam may be let on through the pipe "F" for the purpose of throwing over the lighter products of the distillation, and then superheated steam may be turned on through the distributor "E" for the purpose of completing the distillation, or the whole distillation may be accomplished by either one of these systems alone.

151 Q. Either one conveying superheated steam?

A. No, sir.

152 Q. Suppose the distillation is carried on wholly with the coil "F," isn't it done with superheated steam?

A. I think not.

145 153 Q. You think the idea is that distillation by superheated steam should be solely through the steam distributor "E?"

A. I draw that conclusion from the specification.

154 Q. How is it, then, that on manuscript pages 33 and 34 and 35 of your direct examination you say the reverse of this, and assert that in the complainant's device only a small portion of the superheated steam is injected into the body of the oil, and that the main object of that device is to provide a heating medium by passing superheated steam through closed pipes?

A. I do not see any conflict. The quotation just made in the question was what I said about complainant Everest's invention where he passed a small portion of superheated steam through the jet pipes and injected it into the body of the oil while he passed the main portion of the superheated steam through the closed pipes for the purpose of heating; but the testimony I have just given in the preceding answers related to Tweddle's patent, and not complainant's patent, and I endeavored to express my understanding of his method of operation as described in his specification and drawings.

155 Q. What passage in the complainant's patent can you cite to show that the emission of superheated steam through the pipe "H" is intended to take place to but a small extent, while the principal heating is intended to be done by the closed pipes "I?"

A. I base my statement upon that statement in the specification which says that the pipes "H H" are pierced with numerous small holes for the injection of steam and the drawings, which show the pipes "H H" having perforations which are exceedingly small so that much steam could not pass up. This is shown in the full-sized drawings of the patent itself, but does not seem to be shown at all in the photo-lithographic copies.

156 Q. But you said that the drawings were not made to any scale. How can you tell the size of the holes from the drawings?

A. The specification states that the holes are small. Aside from that, I know it from the statements of the inventor, Mr. Everest.

146 157 Q. Entire answer objected to as not responsive to the question and the question repeated.

A. I cannot tell the size of the holes from the drawings.

Adjourned to 2 p. m.

SATURDAY, *May 24th*,—2 p. m.

Same appearances.

Cross-examination of Mr. OSGOOD continued:

158 Q. In your opinion would there be invention in attaching the steam generator and independent superheating furnace of the Werk patent, Exhibit Y, or of the Howarth patent, Exhibit X, or of the Horner patent, Exhibit J, to the vacuum still described in Tweddle's patent, Exhibit H?

A. I think there would be.

159 Q. On the other hand, is not this connection fairly required to be made by the language of Tweddle's specification, wherein he says the steam may be superheated in any ordinary manner, the exhibits named in the last question showing an ordinary manner of superheating, namely, by a generator and independent superheating furnace?

A. I think not.

160 Q. Why not?

A. Because none of them show the combination of a still in which a vacuum is produced, a separate steam generator, and a separate superheater, the pipe from the superheater extending into the still and producing the heating action; there is nothing in Tweddle's patent to indicate this combination, and he is the only one among the number named who uses a vacuum still; neither is the combination shown in any of the other cases; in my opinion the novelty consists in the combination of all these parts with a vacuum still and not in the individual parts themselves, and none of these cases cited shows this combination as a whole.

161 Q. Suppose that a vacuum still were employed with a steam
generator, but the superheating pipes were heated from the
147 fire of the boiler furnace, as shown in Defendant's Exhibit U,
Newton's Patent; in your opinion would that combination
infringe claim seven?

A. I think not.

162 Q. Why not?

A. Because it has not the element of an independent superheating furnace; the seventh claim in complainant's patent is, I think, limited to a superheating furnace.

163 Q. Do you undertake to affirm that there would be any specific difference in the distilling operation performed by the parts named in the next to the last question from what would be the case when all the elements named in claim seven were used?

A. I think there might be a difference under certain circumstances, especially where it is desirable to use a great degree of heat for producing heavy distillation, and when to accomplish such a result it is necessary to give a rapid passage to the steam through the pipes, and where the capacity of the heat in the steam generator is not sufficient to properly superheat the steam, in which case a separate furnace for superheating the steam would be necessary.

164 Q. Is there any practical difficulty in constructing a boiler furnace of sufficient size and capacity to heat a boiler of moderate dimensions and superheating pipes for the still?

A. I think not, but it might be; in order to properly superheat the steam it was desired to use the furnace might have to be made larger than was necessary to heat the boiler.

165 Q. Well, suppose that was done; it could be done, could it not?

A. Yes, sir; but I think it would be a very ineffective way and a very impracticable way of doing the work.

166 Q. Why?

A. It would require a special and abnormal construction of the boiler and furnace; I do not believe it is a practicable way of super-
heating for this purpose by running the pipe through the fire
148 passages or chimney of a steam generator; the heat is not so
intense there as in a fire chamber for the special purpose.

167 Q. Do you wish me to understand you as saying that by such a superheater steam could not be superheated and kept at or near the temperature specified in the various exhibits as proper for vacuum distillation?

A. I have no doubt but it might be kept at the proper temperature to produce distillation, but I do not believe it could be kept at such high and regular temperature as is necessary in heavy distillation; I don't state this from practical experience, because I have never tested it.

168 Q. Do you state it as your opinion that the result of distillation with one arrangement of the device rather than the other would be a different quality in the oil produced?

A. It would be a different grade whether distilled under a high temperature or a low one.

169 Q. Answer objected to and question repeated.

A. I don't know what is meant by the word "quality," whether a different grade of the same oil or a different kind of oil.

170 Q. What I mean to ask you is, If any one desired to produce it, whether exactly the same quality of oil could not be produced with the one arrangement as with the other?

A. I think not.

171 Q. You think, then, that the use of an independent superheating furnace, as distinguished from a superheating furnace which is not independent, would cause a discernible difference of quality to appear in the oil produced?

A. I think so on the grounds I have stated.

172 Q. That is simply your theory about it?

A. Yes, sir; I do not state it from actual experience; I have no doubt the same result might be attained by making the furnace and fire space in a steam boiler so large and out of proportion to the natural size of a furnace that sufficient superheating capacity might be attained, but it would not be practicable as a matter of economy to
do so.

149 173 Q. It sums up, then, in this, does it not, that in your
opinion an independent superheating furnace is more economical?

A. Yes, sir; and more practicable and more effective.

174 Q. If, prior to the complainant's patent, the combination of a still for petroleum, a steam generator, and an independent superheating furnace for heating the steam were known and used, would there be any feature of invention involved in using such a combination in connection with a vacuum pump over and beyond what would exist without the addition of the pump?

A. I think so.

175 Q. Vacuum stills being well known, why should there be invention in using this combination with the pump more than without it?

A. There is a particular relation between the vacuum still and the use of steam as the heating agent. By removing the pressure in the still by the use of an exhaust pump it requires less heat to vaporize the oil than where the pressure remains in the still. Where fire is applied directly under the still almost any temperature can be attained and the distilling action can be produced without difficulty against the pressure, but it is difficult to produce as high a degree of heat by the use of steam; hence, if the pressure is removed by a vacuum, the steam heat can be applied effectively and the distilling action can be carried to a high point without producing destructive distillation as where direct fire is applied to the still; therefore I think there is a particular relation between such a steam apparatus as described and a vacuum still, in contradistinction to such an arrangement and a still in which no vacuum is produced.

176 Q. You think, then, that it is not a case of double use when the combination of a still for petroleum or steam generator and an independent superheating furnace was known prior to the complainant's patent, vacuum stills being also well known with the
150 use of superheated steam in them to annex the said combination to the vacuum apparatus?

A. I think not, especially with the steam injected into the body of the oil.

177 Q. You think that this would not be a case of analogous use, or of applying the same device to an analogous purpose, but would be a case of downright invention?

A. I think that is correct.

Adjourned to Thursday, May 29, 10 a. m.

THURSDAY, *May* 29, 1884, 10 a. m.

Complainant appeared by T. G. Outerbridge, Esq., solicitor.

Defendant appeared by James A. Allen, Esq., of counsel.

Cross-examination of witness OSGOOD by Mr. Allen continued:

178 Q. In the Ewing patent, Defendant's Exhibit Q, the pipe "D," which conveys the steam within the retort to heat the oil, is not perforated and does not discharge into the oil, does it?

A. No, sir.

179 Q. This apparatus is described in Ewing's specification, is it not, as heated preferably by superheated steam?

A. Yes, sir.

180 Q. The use of the apparatus involves necessarily the use of a steam generator to produce the steam, does it not?

A. Yes, sir.

181 Q. And also the use of a superheater to superheat the steam when superheated steam is used?

A. Yes, sir.

182 Q. We have, then, have we not, when the Ewing device is employed, the use, in combination with a vacuum still or stills for petroleum and a steam generator, of a superheating furnace for heating the steam?

A. I think not. A combination expresses a union of individual features, and I do not find a superheating furnace entering into the combination as an individual feature.

151 183 Q. I am speaking of the Ewing device when put in actual operation with the use of superheated steam, declared by the patentee in the specification to be preferable, and I ask you when the device is so actually used which of the elements named in the last above question are absent?

A. The superheating furnace; the previous question called for a combination consisting of a vacuum still, a steam generator, and a superheating furnace; if the steam were superheated in the ordinary way, by passing the pipe through the fire space of the steam generator, it would not be a combination of these three parts, but only of two of them.

All the answer after the first line objected to.

184 Q. Do you wish me to understand you as saying that superheated steam could be used without the presence of some kind of a superheating furnace, whether independent or not?

A. No, sir.

185 Q. Then if superheated steam was used in the operation of Ewing's device there would necessarily be used some kind of a superheating furnace to superheat it?

A. Yes, sir.

186 Q. I repeat now the 182 question.

A. No, sir; I think not in a patentable sense.

187 Q. Omit, if you please, all reference to the patentable sense, and say whether or not, superheated steam being employed, the elements named in the last question are not all necessarily present in the actual working of the apparatus.

A. They are, if you choose to consider it in that way.

188 Q. Why do you insist, in speaking of the state of the art on this subject, that the running of superheating pipes through the boiler furnace was the usual mode of superheating them prior to Everest's patent, when in point of fact the exhibits here produced relating to the production or use of superheated steam show a greater number having an independent superheating furnace than of any other kind?

152 A. Because the most common form then in use and now in use is to superheat by running the steam pipe through

the same fire that generates the steam. I have never seen any other superheaters or known of any other except these cases cited, and when I am called upon, as in this matter, to express an opinion as to the ordinary process I take the common form.

189 Q. How many superheaters of any kind have you ever seen in use?

A. I cannot say.

190 Q. Give me your best impression.

A. I cannot say. I have seen some.

191 Q. At the date of Everest's patent, as shown by exhibits already referred to in previous questions and answers, an independent superheating furnace—that is to say, a superheating furnace apart from the steam generator—was old, was it not?

A. Yes, sir; in a general sense.

192 Q. Suppose the mechanic who constructed the Ewing apparatus saw fit to construct it with an independent superheating furnace for superheating the steam. Such apparatus would then contain, would it not, all the elements of Everest's 7th claim?

A. Yes, if he also used the steam generator.

193 Q. In your opinion, would there have been any invention on the part of such a mechanic in making the apparatus operative in that way?

A. Yes, sir.

194 Q. State wherein there would be novelty, in your opinion?

A. I have stated fully in previous answers the reasons why I consider it patentable to use a separate superheating furnace in combination with a vacuum still and a steam generator, and that is in reducing heavy grades of oil I do not believe that the steam can be superheated to a sufficient degree to produce the desired working action continuously by running the superheating pipes through the fire space of the generator itself, but that it can be done by the use of a separate superheating furnace.

195 Q. Which, as you have already conceded, is an old
153 contrivance?

A. That is putting it upon another basis. I have stated that a separate superheating furnace in itself is old, but the combination of such a furnace with a vacuum still and a steam generator is new—*i. e.*, was new with complainant, so far as I know.

196 Q. Whether it was combined with a vacuum still for petroleum, or with any other kind of vacuum still, or with a still or retort which was not used with a vacuum, the effect of the independent superheating furnace or of the superheating furnace not independent would be merely to produce steam superheated to a required temperature with or without economy of fuel in so doing, would it not?

A. That is so.

197 Q. In your answers on direct examination you criticize the air pump of Gilbee used in his apparatus as one not operated in a manner to produce a perfect vacuum, and you say, "The object in the complainant's invention was to produce an entire and complete vacuum throughout the whole apparatus." Is not the last state-

ment necessarily incorrect, and is not the difference between the exhausts in the two cases, complainant's and Gilbee's, merely of degree?

A. I do not think it is one simply of degree. I suppose that a perfect vacuum cannot be produced even in complainant's apparatus, but it is desired to make it continuous and as perfect as possible in order to draw over constantly the vapors which are produced by the distilling action. In this manner the pressure is removed from the retort and the steam heat is made more effective in producing the distillation. I cannot understand the construction of Gilbee's pump, and therefore cannot say to what extent it tends to produce a vacuum or whether it tends to produce a vacuum at all. He states in his specification, however, that its object is to produce an intermittent or partial vacuum for a particular purpose. The object of one party, therefore, is to produce an entire or perfect vacuum as nearly as possible and a continuous one, while that of the other 154 party is particularly to produce but a partial vacuum or an intermittent one, and for these reasons I think the difference is not a mere matter of degree.

198 Q. Is the air pump used by Everest any more fully described than that of Gilbee in the specification?

A. I don't know that it is, but any ordinary air pump well known would produce the effect desired, while in Gilbee's case it would require one of some special construction in order to produce the effect which he describes.

199 Q. Both patents speak of the pump simply as an air pump, do they not?

A. Yes, sir.

Adjourned to 3 p. m.

THURSDAY, *May* 29, 1884, at 3 p. m.

Same appearances.
Held open till 7 p. m.

7 P. M.

Same appearances.

Cross-examination of witness OSGOOD by Mr. ALLEN continued:

200 Q. The only peculiarity about Gilbee's air pump is that it has attached to it a series of pulleys or other contrivance for making the action of the pump intermittent and not continuous. You don't understand the pump itself to be described as possessing any peculiar features, do you?

A. I think it has some peculiar construction differing from ordinary air pumps, as exhibited in the drawing, but what that construction is I cannot say.

201 Q. Assuming that it is simply an effective air pump operated so as to have motion at intervals or an intermittent instead of a continuous motion, the result of its use would be a less perfect vacuum in the apparatus than if the action of the pump were uniform, would it not?

A. Yes, sir.

155 202 Q. But such an action would reduce the pressure of the atmosphere within the apparatus and thereby facilitate the decomposition or distillation of the contents of the retort to a certain extent, heat being applied thereto, would it not?

A. Yes, sir; it would assist the act of distillation.

203 Q. We have, then, in Gilbee's apparatus, as actually operated under his patent, Defendant's Exhibit K, the use, in combination with a still in which a partial but not perfect vacuum is produced, of a steam generator and an independent superheating furnace for heating the steam, have we not?

A. I think not, properly. The still, I think, is not properly a still adapted to distilling oils. The heat is applied by direct fire and the distilling action produced by it, while the superheated steam is simply injected or thrown into the body of the material, not for the purpose of producing a distilling action, as I understand it, but simply to produce a chemical decomposition. In Gilbee's case I cannot see how any vacuum can be produced with the construction shown, for the reason that, however effective the pump may be, no valves are shown by which the alternate action of the pump can be made to draw upon the coils of pipe that lead to the still. No steam generator is shown in this case.

All of the above answer after the word "properly" objected to as not responsive to the question.

204 Q. Do you wish to be understood that the Gilbee device can be operated without a steam generator?

A. No, sir; but the steam generator and the superheated steam perform no part in the distilling action.

205 Q. The specification speaks, does it not, of the pipe "*b*," with a cock for the introduction of the steam from the boiler into the worm "*a a a a*," and the drawing shows the pipe "*b*" connecting with the superheater?

A. I think that is correct.

206 Q. Why, then, do you say of this patent that no steam generator is shown in the case?

156 A. Because the combination is not shown in which the generator enters as a part.

207 Q. I understand you to say also that there is no still in Gilbee's case and no operation of distilling carried on?

A. I think there is not a still proper which is adapted to distilling oil.

208 Q. You mean, then, merely that the still "B" is not a still for petroleum?

A. It is not adapted to that purpose in its present form.

209 Q. And you think the drawing of the air pump is defective for want of a showing in it of valves to enable it to act as an air pump?

A. I think so. I think it would be necessary to use valves, whatever might be the construction of the air pump.

210 Q. How long have, to your knowledge, air pumps with valves and working parts to be effective in use been publicly on sale?

Question objected to on the ground that so far as the Gilbee patent describes any air pump at all it purports to be an air pump of special construction, "the action of which is intermittent and should not produce more than about half a vacuum."

A. I cannot say as to that, but the invention is a very old one—known for some hundred years.

211 Q. Do you know of any kind of air pump which even when worked not intermittently but constantly will produce a perfect vacuum?

A. I do not know any that will produce a perfect vacuum. A partial vacuum can be produced by a blower or fan.

Adjourned to Friday, May 30, 1884, at 9.30 a. m.

FRIDAY, *May* 30, 1884—9.30 a. m.

Same appearances.

Cross-examination of witness OSGOOD by Mr. ALLEN continued:

157 212 Q. In your rebutting deposition I understand you to reiterate the construction of the 8th claim which you expressed in your opening deposition, viz., that it was limited to a construction of the independent superheating furnace alongside of the boiler in such a manner that the same fire used in the superheating furnace is conducted through a flue space—which you call a port—at the rear of the boiler, and thence passes into the furnace space of the boiler and assists in generating steam in the boiler.

A. That is correct.

213. What advantages do you understand to be derived from this construction?

A. That the waste heat from the superheater is utilized in assisting to heat the boiler.

214 Q. Suppose the flue space which you call a "port" did not exist and the products of combustion in the superheating furnace had a separate outlet or chimney, would the 8th claim in that case be infringed?

A. I think not.

215 Q. Suppose that the superheating furnace mentioned in the 8th claim constructed in the form which you say is there intended—*i. e.*, with the flue "*n*" conducting the products of combustion to the rear of the boiler and thence passing through the tubes of the boiler to assist in generating steam; suppose that this construction were used of superheating furnace in connection with the boiler and its furnace, but that the still with which such a construction was used was not a petroleum still or was not a vacuum still, would in that case the construction infringe the 8th claim?

A. I don't think the 8th claim is broad enough to cover such a construction, for the reason that it recites "when and in connection with a vacuum petroleum still."

216 Q. In the case stated in my last question would there be the same economy of result in the use of fuel as if the construction stated were used in connection with a vacuum petroleum still?

A. I think so.

158 217 Q. Would the degree of this economy be at all affected by the question whether such a boiler and furnaces were or were not used in connection with a vacuum still for petroleum?

A. I think not.

218 Q. The benefits of the special construction of furnaces which you say is intended to be embraced in the 8th claim relate solely, do they not, to the saving of fuel and the facility of producing steam from the boiler with the least amount of fuel?

A. I think that is substantially the case.

219 Q. If this is so, how, then, can such a special construction be the subject of a claim otherwise than in and of itself; how can it be claimed in combination with a still for petroleum and vacuum pump or other means of producing an exhaust?

A. I think the subject-matter is novel and might have been claimed with a still of any kind, whether vacuum or not, but I think, in view of the quotation I have made in a previous answer, it is confined in this 8th claim to a vacuum still. I think the combination is a legitimate one, as the still, the superheater, and the generator operate together, and this construction with a flue in the rear of the superheater is a benefit to the action. At the same time the construction of the superheater and the boiler might have been the subject, perhaps, of a still further claim.

220 Q. Why could not that claim have been made with a reference merely to the furnaces and boiler and without any reference to a still of any kind in connection with it?

A. It might perhaps have been done.

220 Q. And is not the yoking of this particular construction mentioned with a still for petroleum and a vacuum pump or other exhaust properly what is termed an aggregation of elements and not at all a combination?

A. I think not.

221. Give your reason why not.

A. Because there is a working union between all the parts.

159 222 Q. How does the vacuum pump coact with the products of combustion in passing through the flue space "*n*" in any manner, or act differently from what it would act if the products of combustion from the superheater went out of a separate chamber?

A. I see no particular difference.

223 Q. In what manner do the two furnaces and connecting flue operate differently when the steam from the boiler is conveyed into a still for petroleum from their operation when the steam is applied in some other way or to some different use?

A. I think there is no particular difference in their operation. The 8th claim in complainant's patent is a sub-claim to the 7th. The 7th covers broadly the combination of a vacuum still, a steam generator, and an independent superheater. The 8th is to the same subject-matter, and the same combination, except that it is limited to the special construction of the boiler and superheater, with the flue space connecting the two, by which a better application of the heat is attained. From the fact of its being a sub-claim to the 7th, I think the combination is a legitimate one.

RUFUS F. OGOOD.

Cross-examination closed.

Adjourned to Monday, June 2, 1884, at 11 a. m.

MONDAY, *June* 2, 1884—11 a. m.

Testimony closed.

ADELBERT CRONISE,
Notary Public, & Spe'l Ex.

160 I, Adelbert Cronise, of Dorchester, Monroe county, New York, notary public and special examiner, duly appointed herein, do hereby certify—

That the foregoing is a just and true report of all proceedings had and all testimony taken before me on behalf of complainants in rebuttal herein.

That each witness was by me duly cautioned and sworn to testify the whole truth, his testimony by me reduced to writing and thereafter read, subscribed, and sworn to by deponent before me and in the presence of counsel.

That I am not attorney nor of counsel for either of the parties herein, nor related thereto, nor interested in the event of this action.

[L. S.] ADELBERT CRONISE,
Notary Public & Special Examiner.

161 United States Circuit Court, Northern District of New York.
In Equity.

U. S. Circuit Court.

VACUUM OIL COMPANY
vs. } 3748.
BUFFALO LUBRICATING OIL CO.

Testimony taken and proceedings had before me, pursuant to notice herein, at 24 Powers' building, Rochester, N. Y., Dec. 22, 1884, at 10 o'clock a. m.

Present: T. G. Outerbridge, for complainant; Geo. B. Selden, Esq., of counsel; James A. Allen, Esq., for defendant.

RUFUS F. OSGOOD, recalled by complainant's counsel, testified as follows:

1 Q. Have you read and do you understand the testimony of defendant's expert, Wilhelm, in answer to your rebutting deposition?

A. I have read it and do understand it.

162 2 Q. State whether or not you agree with the conclusions arrived at by Mr. Wilhelm, and give the reasons for any opinion you may express.

A. I do not agree with all the conclusions of Mr. Wilhelm. I think he is in error in many respects. I think he misapprehends my testimony in speaking of the horizontal elongated retort. I did not say, or intend to say, that that particular form was one of the essential features, but I did say that any equivalent form might be used with the same result. This is found in my answer 55, folio 156. I there stated that the third claim was not limited to the use of an horizontal elongated retort, but a retort of such size as to present a large surface for the oil to lie in a thin body over the heating pipes. I suppose it makes no difference as to the particular form of retort, so long as it is of such a size on the bottom as to preserve sufficient surface for the requisite quantity of oil to lie over the bottom in a thin body, so as to cover the heating pipes laid in the bottom of the still, thereby obtaining the best effect of the heat over a large surface. Under these conditions the effect would be the same whether the retort were elongated or of other form.

I think Mr. Wilhelm is also in error in speaking of the series of goose-necks in folios 7 and 8.

He says that two goose-necks come within the requirements of the claims, and are shown in the drawings, and that where two are used there is but one interval or space between the two. The fact is that in the retort "A," next to the condenser, there are three goose-necks leading to the condensers, and in the outer retort, A, there are two goose-necks which pass between the other three, thus making five in all. These are shown at regular and equal distances apart.

I think Mr. Wilhelm is also in error in speaking of the condenser or condensers in folio 9 of defendant's record.

163 The inference drawn from his statement is that I had testified that these goose-necks all opened into one condenser, whereas the fact is I had testified that they all opened into one condenser or into separate condensers, as shown in the alternative form in the patent.

I also think Mr. Wilhelm is in error in his conception of the third claim of complainant's patent. He separates the elements of that claim into its individual parts and finds references of those elements instead of finding references for the combination as a whole. The novelty of the claim, as I look at it, consists in the combination and not in any particular element of the combination. The object is to distill oil under a vacuum with superheated steam heat, and to do this a particular construction of the apparatus is necessary. The retort must be made of comparatively large size to enable the steam pipes to be placed in its bottom and the oil to stand in a thin body above the pipes.

This enlarged form of the retort requires a corresponding change in the means for conveying away the vapors, and for this purpose a series of goose-necks is used opening from different parts of the retort, so that the vapors in different parts can pass off readily and directly and without a circuitous passage from one end to another or from one end to the middle of the retort, as would be the case if but a single goose-neck were used. A single goose-neck of the same capacity as the whole series of goose-necks in complainant's apparatus would not do the work, because, opening from a single point in the retort, the vapors in the remote portions of the retort would still have to make the indirect and circuitous passage through the retort to find the point of discharge before they could escape, thereby interfering materially with the proper discharge of the vapors 164 from the retort; but by using a series of separate goose-necks opening from the retort at different points the discharge is direct and uniform from all parts of the retort. For these reasons I think Mr. Wilhelm has failed to give the proper construction to the third claim of the complainant's patent.

I also think Mr. Wilhelm is in error in his reference to Gengenbre's patent. I still adhere to my opinion that in Gengenbre's patent there is but a single goose-neck, but having two branches connecting with the retort. This goose-neck is marked "*q*" in the drawing. Mr. Wilhelm designates these as two goose-necks. All the vapors which are drawn over must be drawn through a single pipe where it makes its discharge, and all the suction which is produced must be through that single pipe. As I have previously stated, the lower branch, "*p*," is of twice the capacity of the lower discharge end of the pipe "*q*," and it is quite clear to my mind that under these circumstances nearly, if not quite all, the draft would be produced through the lower branch pipe "*p*," and little if any would be produced through the upper branch pipe "*p*." This is for the reason, in the first place, of the shorter passage to the interior of the retort through the lower branch pipe, "*p*," thereby allowing a more direct passage for the vapors to the discharge, and in the second place to the enlarged area of the lower branch pipe, "*p*," by which a greater quantity of vapor can pass in a given time, the capacity of the branch pipe being so much greater than the main discharge pipe below it that the lower branch pipe will furnish the supply for the main pipe without allowing much draught upon the main pipe above the lower branch pipe.

I find in folio 305 of Gengenbre's patent that he states that the two exits ("*p p*") at different points are for the purpose of equalizing the discharge of the volatile products and allowing them to 165 pass off without remaining longer than necessary exposed to the heat of the retort, which would tend more or less to convert them into permanent gas.

If he relies simply upon the suction or draught through the pipe "*q*" to produce this result I think he is in error, because it is obvious to my mind that the suction through the two branches "*p p*" must be very unequal for the reasons I have just named, and while a strong suction would be produced through the lower branch pipe very little would de produced through the upper branch pipe. If it does have the effect which he describes it seems to me there must be a difference in the densities of the vapors at different heights in the retort, being more dense at the bottom than at the top. This is not the case in the retort of the complainant's apparatus, the density of the vapor being the same through all parts of the retort.

Adjourned to 2 p. m.

2 P. M.

Same appearance.

Mr. Osgood continued:

For the reasons above set forth, I think Mr. Wilhelm is incorrect when he states that the operation of this apparatus would not be materially changed if the pipe "*q*" of the upper goose-neck (or branch, as I call it) in the Gengenbre patent were continued downward to the condenser "*r*" and a separate pipe were employed to connect the lower goose-neck "*p*" with the condenser "*r*," as described in folio 13 of his testimony. If such a change were made two separate goose-necks would be employed, each having an 166 independent suction of its own and drawing equally from different parts of the retort, thus having a tendency to equalize the discharge of the vapor, but, as shown in Gengenbre's patent, the single discharge pipe having the two branches can produce no such effect for the reasons before stated.

In addition to this, in Gengenbre's patent, the discharge pipe "*q*" and its branches are entirely on one side of the still retort and connect only with the vertical portion or tower and not with the horizontal portion, where the distilling action takes place; therefore such vapors as are raised in the still have to be carried back to the rear and pass up the vertical portion of the still before they can be discharged. Under these circumstances there can be no uniformity or equality in the discharge of the vapors such as there is in complainant's still, where the vapors are drawn directly from the horizontal still and at not widely separated points.

What I have said above applies equally well to the Hamilton patent, Defendant's Exhibit S, so far as the suction apparatus is concerned.

The main pipe has branches which connect with the still, the upper one being near the top of the still and the others ranged below, and, if two of these were open at the same time, the principal draught would be through the lower one and there would be no equality in the suction. It is evident to my mind, upon reading the specification, that he intended to use only one discharge at a time, because he states that he constructs the still in such a manner that the vapors leave the still as near the surface of the contents of the still as practicable. In folio 428 of the printed record he says:

"I construct the still with several outlets, one below another, and which are provided with stop-cocks, which can be opened in 167 succession, as the contents of the still are reduced; or I construct the still in such a manner that it may be mounted on an axle or pair of trunnions, so that it may be tilted on one side that the outlet orifice may be lowered at pleasure during the operation of distillation."

Here it is evident that it is this object of the inventor to discharge the vapors as near the surface of the liquid as possible, and he does it in either of two ways: First, by providing the several outlets with stop-cocks, which may be opened and closed, or by using only one outlet and tilting or turning the still to change the level of the liquid, relatively to the outlet, to keep it near the same. There is no reference in the patent, so far as I can find, to any method of equalizing the discharge from the still where the still is filled with vapor by the use of two or more separate goose-necks. In my opinion, the material raised by the distillation of resin, in Hamilton's case, would be so heavy it would be necessary to provide a discharge near the surface of the liquid, as he does in that case, and, therefore, the distillation of resin is not analogous in that respect to the distillation of petroleum when the liquid is so ethereal that in the act of distillation the vapors fill the whole body of the retort and require a ready exit.

I also think Mr. Wilhelm is in error in his statements in regard
to the Ewing patent, Defendant's Exhibit Q, folios 25 to 29, inclusive,
when he says that it contains all the elements mentioned in com-
plainant's third claim, combined in the same manner and operating
like the corresponding combination in complainant's patent, except-
ing, perhaps, that the draught is not distributed over so large a sur-
face as in complainant's construction, which results from the
168 difference in the form of the retorts. In Ewing's patent two
sets of condensers and goose-necks with exhausting devices
and connected with the same still on opposite sides.

The whole drift of the specification shows that these were to be used alternately—that is, while one is in operation in distilling the other was inactive. By this means a continuous action of the distilling operation could be kept up by shifting from one to the other. I am confirmed in this by the inventor's statement, near the top of the right-hand column of the first page of the specification, stating the nature of the invention, as follows:

"Third. In the combination of two or more condensers with the still so arranged that each may be used alternately to preserve the vacuum and insure a constant action of the still."

Also from the fact that he claims in his third claim especially—

"The combination of two or more condensers 'H H' with each other, and a vacuum still A, in such a manner that the action may be alternated from one to another to preserve the vacuum and allow the constant running of the still, as set forth."

There is nothing in the specification, so far as I can find, indicat-
ing any other method of operation or any other use to which these
two sets of condensers and goose-necks are applied. If both were
used at the same time the action of the still could not be continuous,
but would be intermittent—that is, the vacuum would have
169 to be first established; then the distillation would have to go
on till the vacuum was impaired; then the distillation would
have to be cut off; then the vacuum produced again, and so on; but
by the use of the two sets alternately the distilling action could be
continuous, and this, I think, was the inventor's object. In such al-
ternate use but one goose-neck would be used at a time in the same
manner as in an ordinary still.

Adjourned to 7 p. m.

7 P. M.

Same appearances.

Mr. OSGOOD continues:

I think Mr. Wilhelm is wrong in regard to the fourth claim of the complainant's patent, in which he says an apparatus with a single goose-neck, having a spacious condenser combined with a retort and the condensing coil to operate in the manner set forth in the claim, answers every requirement of the claim. The specification and drawings show in connection with such devices the series of goose-necks connecting the retort with the condenser, and as this fourth claim follows directly after the third it is natural to suppose that the elements of the third claim are to be used with such devices.

Mr. Wilhelm states that he does not understand my statement that the fourth claim forms a special construction and arrangement by which the single pump can be made to act upon all the goose-necks at once, the action of each being independent of that upon the other.

170 I mean this, that each goose-neck being distinct from the other, it is not affected by the draught through the others, as it is in Gengenbre's case, in which a single discharge pipe, "*q*," is used, having two branches, and in which all the draught from the two branches unite in the single discharge and are affected, more or less, by each other. For instance, in Gengenbre's case the draught through the lower branch "*p*" affects the upper branch "*p*" by lessening its intensity.

I still adhere to the opinion that the pump in Gengenbre is not properly an exhaust pump, but is more properly a force pump, and by its use in that apparatus no effective vacuum could be produced such as is produced in complainant's apparatus, and therefore there would be no necessity for the use of the tank "*r*" for the purpose of breaking the intensity of the suction upon the retort, as in this case. On the contrary, as the contents of the retort to be removed is simply gas, it does not matter how quickly it is removed or whether or not it is removed by impulses of the pump, since there is no liquid to be affected by it.

Therefore there is no need of a condenser for the purpose of checking the draught, and it seems from the specification that the only object the inventor had in the use of it was to collect tar and the less volatile product of distillation.

In Hamilton's patent, Defendant's Exhibit S, the receiver is located at such distance from the still that, notwithstanding it is interposed between pump and the still, the pipe "*k*" gains such a length in passing from the still and through the condenser to the receiver that the receiver acts upon it in a manner similar to a pump, and the oil obtains such headway in passing through this pipe that if the still were used as an oil still, as in complainant's case, it would be likely to draw over oil.

171 In my direct testimony I have stated that it is desirable to locate the condenser near the retort, so as to break as much as possible any sudden impulses which tend to draw the oil over by

making short connections between the condenser and retort by the goose-necks. This is not the case in Hamilton's patents.

I think Mr. Wilhelm is in error in saying that Mr. Horner's invention is what may be called an oil still. That title does not appear in the specification, but only in the certificate of the commissioner attached to the exhibit and at the head of the drawing, and these titles, as I understand, are given by the Patent Office. The title in the specification is "a new and useful improvement in the process of extracting oil from coal, shale, and other minerals," and the invention consists in condensing the oil and separating it from the water and gas by the use of a mixture of cream of tartar, common salt, and slacked lime in the prime condenser. This is not a vacuum apparatus, and I am unable to see any similarity between it and the apparatus embodied in the fourth claim of complainant's patent, in which a vacuum is produced and in which the condenser is used between the pump and the retort to prevent the suction from drawing over the oil.

I still adhere to my opinion as to the seventh claim. This claim covers a combination of three distinct and independent parts—a vacuum still, a steam generator, and an independent superheating furnace. None of the exhibits show this combination. I think Mr. Wilhelm is in error in his statements regarding the Tweddle patent, Exhibit H, for the reason that Tweddle shows no superheating furnace, and describes none, and to meet the combination claimed in the seventh claim something must be supplied which has no existence, so far as the inventor's statements are concerned. If a superheater
172 was used it is natural to suppose that the most common form was used, which, as I have before described, was the fire space of the steam generator itself. I think Mr. Wilhelm is in error where he says that both forms—that is, an independent superheater and one in which the superheating was done by the same fire that generated the steam—were both equally well known, because the form then and now in most common use was that in which the superheating pipes were heated by the same fire that generated the steam.

I think Mr. Wilhelm is also in error where he says, in folio 74, that he does not understand that the use of an independent superheating furnace produces a different result from the use of a non-independent furnace in the same combination.

I have described this matter so fully in my previous testimony that it is unnecessary for me to go into the matter in detail again.

I don't see much in the eighth claim, as testified to by Mr. Wilhelm, for me to rebut. One only disagreement is as to its relevancy in this case. He states he can see no combination in a patentable sense between a steam boiler and a superheater having a communication through a flue space at the rear and a vacuum petroleum still. This combination, I think, is patentable, and as it is a subclaim to the seventh, as I have before stated, I think it is pertinent to this case.

I disagree with Mr. Wilhelm in his answer to the 50 redirect question, in which he states the products produced by the destructive distillation of oleiferous minerals, such as cannel coal and the like,

and the products produced by the destructive distillation of petroleum are similar products, similar oils, and similar gases. In the distillation of petroleum, as I understand, the nature of the oil thrown over and the residuum which is left is the same.
173 No decomposition takes place, and the qualities remain the same. Only the volatile parts or a portion are thrown over. In the destructive distillation of coal and similar minerals decomposition takes place, and the two products, that which is thrown over in the shape of gas or oil and that which remains in the shape of coke or carbon, are of different natures.

Defendant's counsel objects to so much of the foregoing answer as consists of a repetition of the previous testimony or statements of the witness on his former examination.

Also to so much of the said answer as consists of statements of the legal constructions of the different claims of complainant's patent.

Also to so much of said answer as consists of statements as to what matters are legally patentable, and he hereby gives notice that at the hearing he will move to strike out such portions of said answer.

Mr. Osgood states that Mr. Wilhelm's duplicate of Mr. Osgood's sketch is a correct reproduction of Exhibit Z.

Defendant's counsel here requests the complainant's counsel to designate on which of the claims in complainant's patent he will insist at the hearing that the complainant is entitled to recover.

Complainant's counsel declines to state.

174 Proofs in the case closed.

RUFUS F. OSGOOD.

Taken, read, subscribed and sworn to before me this 22d day of December, 1884.

ADELBERT CRONISE,
Special Examiner and Notary Public.

I, Adelbert Cronise, special examiner and notary public, do hereby certify that the foregoing is a just and true report of all testimony taken and proceedings had before me on behalf of complainant herein subsequent to the date of last certificate herein.

That the witness Osgood having been heretofore and by me duly cautioned and sworn to testify the whole truth, his testimony was by me reduced to writing and thereafter read, subscribed, and sworn to by deponent before me, but by consent of counsel not in their presence.

That I am not attorney nor of counsel for either of the parties herein nor related thereto nor interested in the event of this action.

Rochester, N. Y., Dec. 22, 1884.

[SEAL.] ADELBERT CRONISE,
Special Examiner and Notary Public.

H. B. EVEREST.

2 Sheets—Sheet 1

Oil Still.

No. 68,426.

No. 271
V.O. Co.
B.L.O. Co. } p. 176

Patented Sept. 3, 1867

Fig. 2.

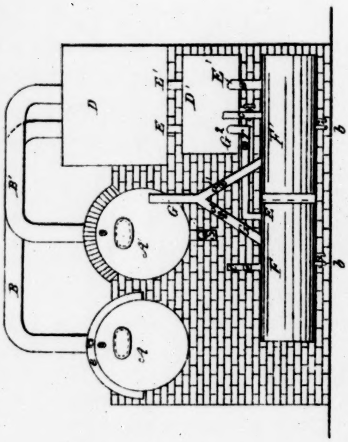


Fig. 1.

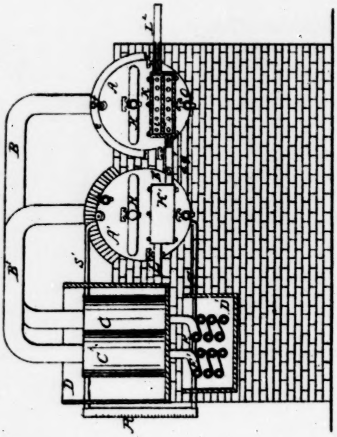


Fig. 4.

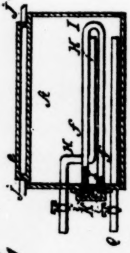


Fig. 5.

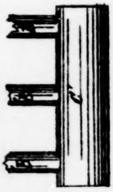


Fig. 6.

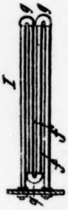
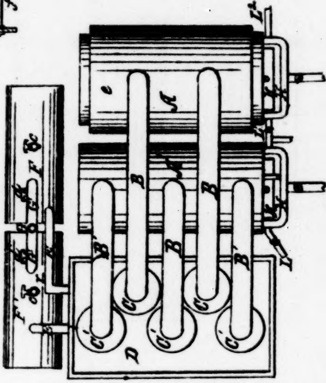


Fig. 3.



Witnesses:

Chas L. [illegible]
Jay Hyatt

Inventor:

H. B. Everest

175

COMPLAINANT'S EXHIBITS.

COMPLAINANT'S EXHIBIT EVEREST VACUUM APPARATUS PATENT.

No. 68426.

The United States of America to all to whom these letters patent shall come:

Whereas Hiram B. Everest, of Rochester, New York, has alleged that he has invented a new and useful improvement in apparatus for distilling petroleum (he having assigned his right, title, and interest in said improvement to the "Vacuum Oil Company," of the same place) which he states has not been known or used before such invention; has made oath that he is a citizen of the United States; that he does verily believe that he is the original and first inventor or discoverer of the said improvement, and that the same hath not, to the best of his knowledge and belief, been previously known or used; has paid into the Treasury of the United States the sum of thirty-five dollars and presented a petition to the Commissioner of Patents praying that a patent may be issued therefor:

These are, therefore, to grant, according to law, to the said Vacuum Oil Company, their successors or assigns, for the term of seventeen years from the third day of September, one thousand eight hundred and sixty-seven, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said improvement, a description whereof is given in the schedule hereunto annexed and made a part of these presents.

In testimony whereof I have caused these letters to be made patent and the seal of the Patent Office to be hereunto affixed.

Given under my hand, at the city of Washington, this third day of September, in the year of our Lord one thousand eight hundred and sixty-seven, and of the Independence of the United States of America the ninety-second.

[L. S.]

W. T. OTTO,
Acting Secretary of the Interior.

Countersigned and sealed with the seal of the Patent Office.

T. C. THEAKER,
Commissioner of Patents.

(Here follows diagram marked pp. 176 & 177.)

178 UNITED STATES PATENT OFFICE.

HIRAM B. EVEREST, of Rochester, New York, assignor to the Vacuum Oil Company, of the same place.

Improvement in Apparatus for Distilling Petroleum.

Specification forming part of Letters Patent No. 68426, dated September 3, 1867.

To all whom it may concern:

Be it known that I, Hiram B. Everest, of Rochester, in the county of Monroe and State of New York, have invented certain new and useful improvements in apparatus for distilling petroleum; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, making part of this specification.

Figure 1 is an elevation of that part of my improved apparatus forming the still proper; Fig. 2, an elevation of the same, looking on the opposite side; Fig. 3, a plan of the same; Fig. 4, a longitudinal vertical section of the primary retort; Fig. 5, a plan showing a modification of the capacious condensers; Fig. 6, a detailed view of the pipes in the retorts; Fig. 7, a vertical longitudinal section of the boiler in plane *x x*, Fig. 9; Fig. 8, a similar section of the superheating-furnace in plane *y y*, Fig. 9; Fig. 9, a plan of the combined boiler and superheating furnace; Fig. 10, an end elevation of the same.

Like letters of reference indicate corresponding parts in all the figures.

This apparatus is designed for manufacturing three distinct products from petroleum under vacuum by steam in an economical and effective manner, whereby the naphtha is removed, as a distinct product, from the illuminating-oil, while the operation of distillation is made more continuous than it otherwise could be, and at the same time a valuable heavy oil obtained, thus rendering the products from petroleum, as a whole, more valuable than they otherwise would be.

My invention consists in combining two or more vacuum petroleum-stills with each other in such a manner that while the lighter hydrocarbons are being distilled from the crude petroleum in one of the stills the heavier portions are being distilled in the other, thus making the operation more continuous than it otherwise would be, the oil being fed from one retort into the other, as circumstances require, at the same time economizing in the amount of steam used for distilling purposes by passing it, in a superheated state, through the heating-pipes in the retort containing the least volatile portions of the petroleum, and afterward conducting it through the pipes in the second retort containing the lighter and more volatile portions of petroleum, thus making the latent heat of the steam effective after the superheat has been extracted from it.

Also, in the construction of a horizontal elongated cylindrical or elliptical vacuum-retort for petroleum-stills, as a cheaper and more advantageous form than those heretofore known or used, for containing straight heating-pipes and exposing a larger surface to the distilling action, and in furnishing attachment for several goosenecks instead of one, as in ordinary stills.

Also in combining with a vacuum retort for petroleum one or more capacious condensers connected with the retort by numerous necks, so that the vapors arising from the oil in the retort may pass off freely and in a more direct line than they otherwise would do, and at the same time preventing the exhaust-pump from drawing the oil from the retort, as is apt to be the case where but one neck is used upon the retort, or where the ordinary condensing-coil is used.

Also in the combination of a capacious condenser or condensers interposed between an ordinary condensing-coil and the retort, so that the direct action of the exhaust-pump upon the oil in the retort is broken or diminished, at the same time the effective condensing power of the apparatus is increased.

Also in the employment of suitable receiving-vessels placed between the vacuum-pump and condensers in such a position that the distilled oil is deposited in them by its own gravity, thus avoiding the delivery of the distilled oils through the pump.

Also in surrounding the upper portion of either or both of the vacuum petroleum retorts with a jacket for applying steam or heated air externally to the same, to obviate the condensation of the oil-vapor as it rises against the upper surface of the retort.

Also in the construction and use of an independent superheating-furnace for superheating steam when used in combination with a steam-generator and a vacuum-still for petroleum, as hereinafter set forth.

179 Also in constructing said independent superheater for steam alongside of a boiler in such a manner that the same fire used in the superheating-furnace is conducted through a flue-space at the rear of the boiler and, thence passing through the tubes of the boiler, assists in generating steam and thus economizing the use of fuel and increasing the effective capacity of the distilling apparatus.

Also in the construction of said superheating-furnace for steam with numerous sections of small pipes connected with main pipes for induction and eduction of the steam in such a manner as to use straight gas-pipe instead of coils and to present a larger amount of heating-surface than is ordinarily the case, thereby insuring a suitable degree of heat for distilling petroleum without so great danger from explosion of the superheater.

Also in connecting the main eduction pipe of the superheater with the numerous sections of small pipes in the interior of the retorts by means of a steam-chest bolted to the head of the retort, one portion or flue-space in said steam-chest admitting the steam to a tier of smaller heating-pipes in the retort, while the other flue-space exhausts the same.

Also in placing in upright position and packing the sections of small heating pipes in the retort through the head of the same in such a manner as to be easily removed for repairs.

Also in the application of an oil-gage to a vacuum still for petroleum similar in construction to the gage commonly used upon
vacuum pans for sugar and made available for observations
180 of the quantity of oil in the retort by placing the same at an
unusual distance from the retort and keeping the liquid in
the gage at a low temperature.

As represented in the drawings, A is the primary and A′ the secondary retorts, which are connected by a draw-pipe, *a*, with a stopcock, Fig. 1, by which the contents of A are drawn into A′. These retorts, instead of being made upright, as usual, are horizontal and of considerable length, being either cylindrical, as shown, or any other form that will answer the desired purpose. This form enables me to insert the straight heating-pipe hereafter described without difficulty and to arrange the same so as to produce a large heating-surface, as well as to attach and detach easily for repairs, &c. It also presents a larger vaporizing-surface than the ordinary upright form and gives room for the attachment of a series of goose-necks by which the vapor is carried off more readily. The primary retort A (and the other, if desired) has its top covered or inclosed by a jacket, *e*, Figs. 1 and 4, by which steam or hot air is let on through pipe *j* and discharged through pipe *j*′. By this means I am enabled to prevent condensation of the vapor that would occur if it came directly in contact with the top of the retort cooled by the surrounding atmosphere. The top being always hot as well as the bottom, the vapor will retain its form and pass off. In addition to this the heated top of the retort serves to vaporize such particles as are carried up without being properly separated. From the tops of the retorts, respectively, passes a series of goose-necks, B B and B′ B′,
connecting with corresponding series of capacious con-
181 densers, C C and C′ C′, submerged in a water-tank, D. In-
stead of the upright form of the condensers indicated in Fig.
1 the horizontal elongated form indicated in Fig. 5 may be employed. With the bottom of the series of condensers connect two separate condensing-coils of pipe E E′, resting in a water-tank, D′, and these coils, passing out through the tank, connect, respectively, with receivers F F′ for retaining the distilled oil. The position of these receivers is lower than the condensers, so that the distillate will be deposited in them by their own gravitation.

The receivers are provided at the bottom with draw-cocks *b b* for discharging the refined oil, and with air-cocks *c c* for admitting air to supply the vacuum in drawing the oil. From the tops of the receivers extend branch exhaust-pipes G^1 G^2, uniting in a single exhaust-pipe, G, which connects with the pump for exhausting air from the apparatus. When the exhaust is applied it will be seen that it operates to produce a vacuum from the receivers clear back to the retorts through the parts E E′, C C′, and B B′.

In order to make the pump act, when desired, upon only one of the retorts and its accompanying connections, the branch pipes G^1

G^2 have cocks *d d′*, as shown. The retorts are provided each with jet-pipes H H, pierced with numerous small holes, for the injection of steam into the body of the oil, the said pipes passing out and connecting with the main pipe from the superheater, which will presently be described.

182 The retorts have each also, instead of coils, a series of heating-pipes, I I, made of straight pieces *f f* of gas-pipe, screwing into returns *g*, and forming either single bends, as in Fig. 4, or double ones, as in Fig. 6, as may be desired, though the latter are the most effective in large stills. These pipes are placed side by side in the retorts and rest in a vertical position, and the free ends are inserted in the head of the retort and are held in place and packed at the same time by lock-nuts which screw on the pipe inside and out and clamp against the said head, or they may be fastened in by calking. The ends of the pipes thus arranged open into compartments *i i′* of chests K K′, bolted to the heads of the retorts. The main induction-pipe L from the superheater opens into the upper compartment, *i*, of the steam-chest K′. The steam thus admitted is carried round through the pipes I into the lower compartment *i′*, and thence it is carried by pipe L into the lower compartment of steam-chest K, when it again makes a circuit through pipes I of the retort A, and finally escapes through the exhaust-pipe L^2.

183 The steam generator consists of a boiler, M, having flue-pipes *k k*, as usual. The outer ends of the flue-pipes open into a flue-space, *l*, which is an extension of the fire-chamber N. Side by side with the boiler is a superheating-furnace, O, being separated only by a wall, *m*. This wall has an opening or passage, *n*, in which is a damper, *o*, for regulating the escape. Thus the products of combustion and the escape-heat from the superheating-furnace pass into and through the flue-pipes of the boiler with those from the fire-chamber of the boiler itself, and thus assist in generating the steam.

The superheating-furnace is made with the upward incline shown in Fig. 8. At a suitable position across this furnace are placed bars *p p*, which sustain the series of superheating-pipes I′. These pipes are constructed of straight pieces, *f′ f′*, of gas-pip, screwing into return bends *g′*, in the same manner. The free ends of the pipes are passed through the side of a chest, K^2, and secured by lock-nuts in the same manner as in the retorts. The chest K^2 is likewise formed with two compartment, i^2 i^3, into which the opposite ends of the superheating-pipe open. Into the upper compartment opens the induction steam-pipe P from the boiler, and from the lower compartment extends the supply-pipe L, before mentioned, that conducts the steam to the retorts. A circuit of the steam from the boiler is thus made through the superheating-pipes I′ and discharged to the retorts. The superheating-pipes, in the position shown and described, are so situated as to receive the best action of the fire, and to be easily removed from place by simply slipping down endwise and passing out of the door of the furnace.

The height of the oil is indicated in the retort by an ordinary gage, R, connected at the top and bottom by means of pipes *s s*, with the top and bottom of the retort, as indicated in Fig. 1. I prefer to run one or both of these pipes through a body of water, for the purpose of cooling the liquid that enters the gage. In the drawings they are shown as passing through the tanks D D′. If desired, the other retort may be supplied with a gage in a similar manner.

The operation of the apparatus before described is as follows: The air is exhausted by means of the air-pump, as before described. The primary retort A is now partially—say, about one half—filled with crude oil through supply-pipe Q, and the cock in pipe *a* is closed to prevent passage to A′. The steam from the boiler is now let through the pipes gently, and the vapor soon begins to rise. The naphtha, which is the first product, is passed through the primary apparatus B C D and deposited in receiver F, from whence it is drawn by closing cock *r* in pipe E and opening the discharge and air-cocks *b c*, as before described. A fire is now kindled in the superheating-furnace O, and a part of the remaining oil is drawn from A into A′, which is accomplished by partially cutting off the exhaust from A by cock *d* and turning it on to A′ by cock *d*. The partially-distilled oil is now kept at the proper level in A by feeding it from A, as described, and the distillation in A′ becomes very effective, and, for a time, continuous. The distilled oil from said retorts is thus carried over at once into the receivers F F′, where it is discharged at pleasure.

It will be seen that the retort A is used first for removing the naphtha, and afterward for distilling off the lighter gravities of burning oil by means of the latent heat contained in the exhaust steam after it passes from retort A′, which latent heat would be otherwise lost. By this arrangement, also, the heated oil in retort A is fed into A′ as fast as required, so that the superheat is used upon and for distilling the heavier gravities of petroleum constantly, while the latent heat which still remains in the steam after passing from retort A′ is sufficient to remove the lighter portions from the crude oil. By this duplication of the stills I am enabled to remove the naphtha, while the operation of distilling is made more continuous than it otherwise could be; and in this respect alone there is a very great advantage over a single-acting vacuum-still, in which, by a continuous feed, the naphtha must necessarily be incorporated with the distilled oil, or else, as ordinarily, the oil deposited in charges, which is a source of difficulty.

The employment of the series of goose-necks B B′ instead of the ordinary single goose-neck insures a more effective discharge of the vapor, and also, by presenting a larger surface, prevents the drawing over of the contents of the retorts. The interposition of the capacious condenser or condensers C C′ between the coils E E′ and the retorts is of much advantage in this respect, for it furnishes, so to speak, a break to the action of the exhaust of the pump between the said coils and goose-necks, which obviates the tendency to draw out the oil.

When the oil in retort A′ has been reduced to the desired consistency it is discharged through pipe S, Fig. 2.

My object in this invention is to afford an easy and effective separation of petroleum into products more valuable, as a whole, than have been heretofore produced from crude oil. These products, as I use the apparatus, consist, where Pennsylvania well oils are used, gravity 45° Baumé, of naphtha, say, ten to twelve per cent., pure hydrocarbon oil for illumination, say, forty-four to forty-eight per cent., heavy green oil, valuable for currying and oiling leather, say, thirty-six to thirty-eight per cent.

It has been the object heretofore to produce from petroleum the largest possible amount of kerosene or burning oil. This apparatus will not effect that result; neither do I desire to produce seventy-five, eighty, or ninety per cent. of illuminating distilled oil; but by
long and diligent experiments I have discovered that the sep-
184 aration of petroleum into the constituent parts named, and
into about the proportions named, results in greater profit to the manufacturer than otherwise, and the within-described apparatus is especially constructed to bring about the desired result.

Now, what I claim as my invention, and desire to secure by letters patent, is—

1. The combination of two or more vacuum petroleum-stills, so arranged that the oil is fed from one retort into the other as it increases in specific gravity during the distillation, and economizing the use of steam used in the vaporization of the oil in the retorts by passing it first through the heating-pipes in the retort containing the heavier oils and afterward conducting it through the heating-pipes in the retort or retorts containing the oils of lighter specific gravity, as herein set forth.

2. The construction of a horizontal elongated cylindrical or elliptical vacuum-retort for petroleum, arranged and operating in the manner and for the purpose herein set forth.

3. Connecting the retorts of a vacuum-still with the condenser or condensers by two or more goose-necks, so as to distribute the exhaust in the retort or retorts and thus prevent drawing the oil over, at the same time facilitating the escape of the vapor, as herein set forth.

4. So combining the capacious condenser or condensers with the retort or retorts and the condensing coil or coils that said capacious
condenser or condensers will serve as a check to diminish the
185 direct action of the exhaust-pump upon the oil in the retorts,
as set forth.

5. Placing the receiving-vessels F F′ in such a position as to allow the distilled oil to be discharged by its own gravity and without passing through the pump, as set forth.

6. Surrounding the upper portion of the retort or retorts by a jacket or its equivalent for the reception of steam or hot air, to prevent condensation, as described.

7. The use, in combination with a vacuum still or stills for petroleum and a steam-generator, of an independent superheating-furnace for heating the steam, as specified.

8. The construction of said superheating-furnace in combination

with a steam-boiler, substantially as and for the purpose set forth, when and in connection with a vacuum petroleum-still.

9. The construction of a superheater for distilling purposes with numerous sections of small straight pipes for advantage of heating-surface, with facility of building and repairs, as shown.

10. Connecting the main induction and eduction steam-pipes L L′, leading from the superheater to the still, with the sections of small heating-pipes within the retorts by means of a steam-chest, K′, bolted to the head of the still, substantially as and for the purposes set forth.

11. Placing the small sections of heating-pipes in the retort in upright position, substantially in the manner and for the purpose set forth.

186 12. The application of an oil-gauge to a vacuum petroleum-still, arranged and operating substantially as set forth.

13. The combination of a steam-generator, superheating-furnace, and vacuum apparatus as a whole, constructed and operating substantially in the manner set forth.

14. The separation of petroleum into the constituent parts specified and about the proportions named by means of an apparatus as herein described.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

HIRAM B. EVEREST.

Witnesses:
R. F. OSGOOD.
JAY HYATT.

187 *Stipulation as to Exhibit "Model Defendant's Vacuum Still."*

U. S. Circuit Court, N. D. of N. Y. In Equity.

VACUUM OIL COMPANY *vs.* BUFFALO LUBRICATING OIL COMPANY, Limited.	No. 3748.

It is hereby stipulated that in preparing transcript of record herein on appeal to U. S. Supreme Court the clerk may omit Complainant's Model Exhibit "Defendant's Vacuum Still," and that the original model exhibit may be forwarded to the Supreme Court when the same is required for use on the argument.

Dated April 28, 1885.

THEODORE BACON,
Complainant's Solicitor.
CORLETT & HATCH,
Defendant's Solicitors.

(Indorsed:) 3748, Equity. Vac. Oil Co. *vs.* Buf. Lub. Oil Co., L'd. Stipulation as to model exhibit. Filed Apr. 30, 1885. Wm. S. Doolittle, clerk.

United States Circuit Court, Northern District of New York.

THE VACUUM OIL COMPANY
against
THE BUFFALO LUBRICATING OIL COMPANY, Limited. } Equity, 3748.

Testimony taken and proceedings had before me, Charles B. Hill, as special examiner on behalf of defendant, pursuant to the annexed stipulation and notice and the order entered thereon.

TUESDAY, *July* 10, 1883—2.30 p. m.

Mr. James A. Allen appears as counsel for the defendant; Mr. George B. Selden and Mr. T. G. Outerbridge appear as counsel and solicitor for the complainant.

Defendant's counsel offers in evidence a certified copy of the specification and drawings of letters patent of the United States granted to Jacob Reese May 19, 1863, No. 38602, for an improvement in oil still, and the same is received in evidence and marked Defendant's Exhibit A, C. B. H., Sp'l Ex'r.

Defendant's counsel offers in evidence a printed Patent-Office copy of the specification and drawings of letters patent of the United
189 States to Abram D. Higham for an improvement in distilling petroleum, dated April 24, 1866, No. 54157, and the same is received and marked Defendant's Exhibit B, C. B. H., Sp'l Ex'r.

Defendant's counsel offers in evidence a printed Patent-Office copy of letters patent of the United States granted to Augustus H. Tait and Joseph W. Avis for improvement in distilling apparatus, dated March 20, 1866, No. 53359, and the same is received and marked Defendant's Exhibit C, C. B. H., Sp'l Ex'r.

Defendant's counsel offers in evidence a printed Patent-Office copy of letters patent of the United States to E. G. Kelly and A. H. Tait for apparatus for distilling oils, dated June 18, 1861, No. 1564, and the same is received in evidence and marked Defendant's Exhibit D, C. B. H., Sp'l Ex'r.

Defendant's counsel offers in evidence a certified copy of the specification and drawing of letters patent of the United States to James Perkins and William H. Burnett, dated April 4, 1865, No. 47125, and the same is received in evidence and marked Defendant's Exhibit E, C. B. H., Sp'l Ex'r.

Defendant's counsel offers in evidence a printed Patent-Office copy of the specification and drawings of letters patent of the United States to Huot Fleury for improvement in distilling petroleum, dated October 24, 1865, No. 50571, and the same is received and marked Defendant's Exhibit F, C. B. H., Sp'l Ex'r.

Defendant's counsel offers in evidence a certified copy of the specification and drawings of letters patent of the United States granted to Henry P. Gengembre, dated June 21, 1859, No. 24454, for improvement in oil still, and the same is received and marked Defendant's Exhibit G, C. B. H., Sp'l Ex'r.

190 Defendant's counsel offers in evidence a printed Patent-Office copy of reissued letters patent of the United States granted Herbert W. C. Tweddle for improved apparatus for distilling coal oil and other substances, dated November 27, 1866, No. 2404, and the same is received and marked Defendant's Exhibit H, C. B. H., Sp'l Ex'r.

Defendant's counsel offers in evidence a printed Patent-Office copy of letters patent of the United States — to P. H. Vanderweyde for improvement in distilling petroleum and other liquids, dated Sept. 11, 1866, No. 58005, and the same is received in evidence and marked Defendant's Exhibit I.

Defendant's counsel offers in evidence a Patent-Office certified copy of the specification and drawing in the matter of the English letters patent granted George Hamilton January 18, 1859, No. 149, for improvements in treating resin and resinous substances to obtain products therefrom, and the same is received in evidence and marked Defendant's Exhibit S.

Defendant's counsel offers in evidence a certified copy of the specification and drawing of letters patent of the United States granted E. N. Horner for improvement in oil still, dated January 25, 1859, No. 22727, and the same is received and marked Defendant's Exhibit J.

Defendant's counsel offers in evidence a United States Patent Office certified copy of the specification and drawings in the matter of the English letters patent granted William Arnaud Gilbee for improvement in treating fatty bodies and in the apparatus employed therein, dated December 27, 1858, No. 2958, and the same is received in evidence and marked Defendant's Exhibit K.

Defendant's counsel offers in evidence a printed Patent-Office copy of letters patent of the United States granted James J. Johnston, dated June 20, 1865, No. 48285, and the same is received in evidence and marked Defendant's Exhibit L. 191

Defendant's counsel offers in evidence a United States Patent Office certified copy of the specification and drawing in the matter of English letters patent granted Charles Constant Boutigny December 18, 1852, No. 1105, for improvements in distillation and in the apparatus employed therein, and the same is received and marked Defendant's Exhibit M, C. B. H., Sp'l Ex'r.

Defendant's counsel offers in evidence a printed Patent-Office copy of letters patent of the United States granted A. Millochau for an improvement in the distillation of petroleum, dated March 13, 1866, No. 53167, and the same is received in evidence and marked Defendant's Exhibit N, C. B. H., Sp'l Ex'r.

Defendant's counsel also offers in evidence a printed Patent-Office copy of the specification and drawing of letters patent of the United States granted Orazio Lugo for improvement in apparatus for distilling petroleum, dated September 18, 1866, No. 58113, and the same is received in evidence and marked Defendant's Exhibit O, C. B. H., Sp'l Ex'r.

Defendant's counsel offers in evidence a printed Patent Office copy of the specification and drawing of letters patent of the United

States granted M. P. Ewing, assignor, for improved material for lubricating and other purposes, dated September 11, 1866, No. 58020, and the same is received and marked Defendant's Exhibit P, C. B. H., Sp'l Ex'r.

Defendant's counsel offers in evidence a printed-Patent Office copy of the specification and drawing of letters patent of the United States granted M. P. Ewing, assignor, for improvement in apparatus for distilling petroleum, dated July 31, 1866, No. 56852, and
192 the same is received and marked Defendant's Exhibit Q, C. B. H., Sp'l Ex'r.

Defendant's counsel offers in evidence a printed Patent-Office copy of the specification and drawings of letters patent of the United States granted to Alexis Thirault for improved apparatus for treating petroleum, dated April 16, 1867, antedated April 5, 1867, No. 63963, and the same is received and marked Defendant's Exhibit R, C. B. H., Sp'l Ex'r.

Defendant's counsel offers in evidence a printed and bound volume entitled "A Practical Treatise on Coal, Petroleum, and other Distilled Oils, by Abraham Gesner, M. D., F. G. S., second edition, revised and enlarged by George Weltden Gesner, consulting chemist and engineer. New York: Bailliere Brothers, 520 Broadway. London: H. Balliere, 219 Regent street. Melbourne: F. Bailliere, Collins street. Paris: J. B. Bailliere *et Fils*, Rue Hautfeuille. Madrid: C. Bailey, Bailliere, Calle del Principe, 1865," and reads from said volume the following extracts, commencing at page 85:

Superheated Steam Apparatus.

"Steam can be superheated for distilling purposes by any mode which involves its passing over hot surfaces before entering the charge of oil in the still. A bench of three ordinary gas retorts connected with pipes would form a very good superheater. In the above diagram is an arrangement for superheating, which has been found satisfactory. A series of cast-iron pipes, B, four feet in length, two inches in diameter, metal two inches thick, slightly arched and connected by return bends D, are placed in an oven, A. The damper L regulates the heat. The fire is prevented from striking directly upon the pipe by fire tiles placed under them, with small flues passing through them between the pipes. The inlet of
193 steam is regulated by the valve E. A small globe and drip-cock, H, should be placed on the boiler side of the valve to insure the drawing off of any water before letting steam into the superheater. The pipe connecting with the boiler should enter a drum on the top of the boiler so as to get the steam as dry as possible."

"The exit from the superheater is a wrought-iron pipe of the same diameter carried into the still at the top and carried down its side and coiled once or twice around its bottom. This pipe is perforated with holes three-sixteenths of an inch in diameter. The still may be set in sand. A pressure of forty pounds in the boiler is the proper one to work with. A mode of working the superheater is given further on."

"Andrew McLean, of Liverpool, has been very successful in introducing superheated steam in coal and petroleum distillation. His application of superheated steam to the distillation of bituminous shales in Great Britain is of great utility."

Complainant's counsel also reads from said volume, commencing at page 161 :

"*Petroleum Refinery.*"

"The drawings on pages 162 and 163 represent a convenient arrangement of apparatus for refining petroleum. The superheated steam apparatus may be employed or not, at the option of the refiner. If it is employed the mode of operation would be as follows:

"The still A is filled to within six inches of the top, to which the dome is bolted, by the pump B, which draws the petroleum from the settler E, in which is a coil of inch iron steam pipe to keep the
temperature of the settler at 90° Fah. The settler is filled from
194 the underground receiver D by the pump B. This under-
ground receiver is so arranged as to receive the petroleum from barrels being rolled over it and emptied.

"The still being charged and the superheater having a fire under it which would give the steam a temperature of 300° Fah., the drip-cock of the superheater (see cut on page 86) is opened to permit any water or moist steam to escape, and afterwards the steam valve communicating with the superheater is opened gradually and the steam permitted to pass into the still by the pipe E, which is a two-inch wrought-iron pipe bent under the dome, carried down the side of the still, coiled twice around the bottom of the still, and perforated with holes not less than one-eighth inch in diameter. As the hot steam enters the still there will be for some time a considerable condensation. This can be remedied by having a gentle fire under the still, but it is not absolutely necessary, as a still set in sand will soon become heated to the proper point. The worm tub I must be abundantly supplied with cold water from the water tank outside the building or by a pump. The inlet to the tub should be at the bottom and the overflow at the top, by which the hot water can be carried away to the drain or to a vessel from which it can be pumped into the boilers. A great economy of heat can be effected by making use of hot instead of cold water for feeding the boilers. The distillate comes over about half water. As it proceeds the heat under the superheater is increased, and more steam at a pressure of forty pounds in the boiler is passed into the still. At the close of the distillation the superheater pipes will be at a temperature of 700° Fah., when the petroleum employed is of proof, 40° to 45° Baume. For heavier oils it will be at 800° Fah. The rapidity of the distillation is regulated by the valve on the superheater, and it can be made
perfectly uniform with very little attention. There is no
195 danger of "boiling over," as in distillation over open fire,
which cannot always be controlled.

"The naphtha which comes over first to the extent of about fifteen per cent. of the charge is cut off at 58° Baume generally and permitted to run into a receiver. It may be redistilled to purify it for market."

Defendant's counsel also reads from said book, at page 165, the following:

"The heavy tar remaining in the still is drawn off by a cock placed near its bottom after a few hours or when it has cooled sufficiently to prevent its taking fire on exposure to the air.

"In the drawings the stills and superheaters are in sets each side of the boilers. This is to save room and to have each set independent of the other, so that in case of repairs being needed to one set the whole work would not be deranged and hindered. The building is capable of two more sets of stills and boilers on the opposite side, thus doubling its capacity. The agitator projects a convenient distance above the floor of the upper story to admit of easy handling of the carboys of acid which are to be emptied into it. This upper floor also affords space for making the alkali wash, which, when caustic soda is used, is simply by dissolving it in water until the proof is 36° by Baume's lye meter. When soda ash is employed the mode already described will give it sufficient causticity. Barrels, cans, and many other articles can be stored on this floor.

"Where superheated steam is not used the boilers will not be required of the size shown in the drawing. The manipulation with the acid and alkali will be the same, however. In regular working one of each set of stills should be kept always at work, the fire under
the superheater never being permitted to become very low or
196 so low as to cause cracking of the pipes. There is no economy
of fuel permitting the fire to die out."

Defendant's counsel also produces in evidence the diagrams appearing therein, found on pages 86, 182, and 183.

Defendant's counsel offers in evidence a certified copy of letters patent of the United States granted Edward Braggins for an improvement in oil still, dated March 7, 1865, No. 46633, which is received in evidence and marked Defendant's Exhibit T, C. B. H., Sp'l Ex'r.

Adjourned to July 11, 2 p. m.

July 11—2 p. m.

Met pursuant to adjournment.
Same attendance.

Edward Wilhelm, a witness produced by the defendant, being duly sworn, testified as follows:

1 Q. Please state your name, age, occupation, and place of residence.

A. Edward Wilhelm; age, 37; mechanical engineer and solicitor of patents; Buffalo, N. Y.

2 Q. Please state your experience and qualifications as a mechanical expert in patent cases.

A. I graduated as a mechanical engineer in 1864. I have been continually engaged since 1867 in soliciting patents, and during the last ten years I have testified in numerous patent causes as mechanical expert.

3 Q. Please state whether you have read and examined the specifications and drawings of letters patent of the United States, No.
68426, to the Vacuum Oil Company, dated Sept. 3, 1867,
197 marked Complainant's Exhibit Everest Vacuum Apparatus
Patent, and whether you understand the same and the inventions therein purported to be described.

A. I have carefully examined the letters patent mentioned in the question and understand the construction and operation of the apparatus described and shown therein and the several inventions claimed in the specification.

4 Q. Have you also read and examined the specifications and drawings of the various letters patent put in evidence in this cause on the part of the defendant, and marked Defendant's Exhibits A to T, both inclusive, and do you understand the said specifications and drawings and the several inventions therein set forth and described?

A. I have carefully examined the several letters patent mentioned in the question, and I understand the inventions described and shown therein.

5 Q. Have you also examined the model put in evidence in this cause by the complainant and marked Exhibit Model Defendant's Vacuum Still, and do you understand the construction of the apparatus exhibited by the said model?

A. I have examined said model and understand the construction and operation of the apparatus represented by said model.

6 Q. Please state whether you find in said model the construction and arrangement set forth in the first claim of Complainant's Exhibit Everest Vacuum Apparatus Patent.

A. I do not.

7 Q. Do you find in said model the construction claimed in the second claim of said patent? And give your reasons for such opinion
and conclusion as you may state.

198 A. The construction mentioned in the second claim of complainant's patent consists of a vacuum retort having a cylindrical form and arranged with its longitudinal axis in a horizontal position. The retort may be found in cross-section, or it may be of any other similar form in cross-section, the distinguishing feature of the patented construction being the arrangement of the retort with its longitudinal axis in a horizontal position, as contradistinguished from a similar retort placed with its longitudinal axis in an upright position, or from a round retort having the form of a kettle. In the model I find a retort having the form of an elongated cylinder arranged with its longitudinal axis in a horizontal position, and I therefore find in said model the construction set forth in the second claim of complainant's patent, the retort in the model being combined with the other adjuncts of a distilling apparatus, such as heating and condensing devices, to operate as a vacuum retort.

8 Q. State whether or not, in view of the state of the art disclosed

by the said exhibits put in evidence on the part of the said defendant, the said second claim possesses novelty; and, if not, upon what grounds you hold that the said claim is without novelty.

A. I find a vacuum retort of the construction set forth in the second claim of the complainant's patent, in the patent to Ewing, Defendant's Exhibit P. This patent describes and shows a vacuum oil still containing a retort which is elongated and arranged with its longitudinal axis in a horizontal position. The upper part or body of the retort is cylindrical in form and the bottom is flat, which is, of course, an immaterial variation. The specification of complainant's patent states that the horizontal elongated retort is more desirable than other forms, because it is adapted to contain straight heating pipes, and because it exposes a larger 199 surface of the oil to the distilling action, and because it furnishes room for attaching several goose-necks, instead of one, for carrying off the vapors. All of this is true of the retort shown and described in Exhibit P; said exhibit does not show several goose-necks, but the retort is capable of being provided with several goose-necks if it was so desired.

I find elongated cylindrical retorts in Defendant's Exhibit C, patent to Tait and Avis; also in patent to Higham, Defendant's Exhibit B; also in patent to Reese, Defendant's Exhibit A; also in patent to Lugo, Defendant's Exhibit O; also in patent to Horner, Defendant's Exhibit J; also in patent to Vanderweyde, Defendant's Exhibit I. In all these exhibits the elongated cylindrical retorts are arranged with their longitudinal axis horizontally, whereby a larger surface of oil is exposed to the distilling action than there would be if the retorts were arranged in a vertical position.

In the patent to Reese, Defendant's Exhibit A, the horizontal elongated retort is provided with three goose-necks.

In Defendant's Exhibits B and I the horizontal elongated retort is combined with the appurtenances of the vacuum distilling apparatus.

I find, therefore, that the construction of a horizontal elongated cylindrical or elliptical vacuum retort for petroleum set forth in the second claim of complainant's patent is shown and described as a device in the exhibits above referred to, and that such exhibits also disclose the use of such a retort in connection with heating, condensing, and exhausting devices analogous to those with which it is combined in complainant's patent.

9 Q. Please state whether or not you find, in view of the state of the art shown by the exhibits mentioned in the fourth question, that the third claim of said complainant's patent possesses novelty, and state the grounds of any opinion which 200 you may express.

A. The third claim involves as its elements the retort, the condenser, an exhaust pump or other exhaust apparatus, and two or more goose-necks, whereby the condenser is connected with the retort. The distinguishing feature of this claim lies in the use of the two goose-necks instead of one for the purpose of distributing the exhaust in the retort and facilitating the escape of the vapors.

I find in the patent to Gengembre, Defendant's Exhibit G, a retort, a condenser, an exhaust pump, and two goose-necks connecting the retort with the condenser. The specification of this patent states that the tower retort has two or more exits, P P, at different points to equalize the discharge of the volatile products. That portion of the retort to which the goose-necks are applied is arranged in an upright position, but as this retort is filled with solid material—coal, for instance—the two goose-necks bear the same relation to the material in the upright retort that the two goose-necks bear in complainant's patent to the oil in the horizontal retort.

I find in the patent to Reese, Defendant's Exhibit A, a retort provided with three goose-necks, but I do not understand that this retort is combined with a vacuum apparatus.

I find the combination of a retort, an exhaust apparatus, a condenser, and a single goose-neck connecting the retort with the condenser in Defendant's Exhibits E, I, B, K, F, and D.

In Defendant's Exhibit Q, patent to Ewing, I find the combination of a retort with two goose-necks, two condensers, and two exhaust devices.

In Defendant's Exhibit S, English patent to Hamilton, I find a combination of a retort, an exhaust apparatus, condenser, and
201 four goose-necks connecting the retort with the condenser.
In this patent the goose-necks are arranged one above the other, and the lower three goose-necks are provided with stop-cocks, which are opened one after another as the level of the liquid in the retort sinks gradually and exposes the inner ends of these goose-necks to the vapor.

I find, therefore, that it was old prior to complainant's patent to connect the retort of a vacum still with a condenser by two or more goose-necks, so as to distribute the exhaust in the retort, as specified in the third claim of complainant's patent. This is shown by Defendant's Exhibits G and S. The invention is also, in my opinion, fully anticipated by the defendants exhibits which I have mentioned in this answer, and which show a single goose-neck connecting the retort with the condenser, because there is no invention in duplicating a goose-neck. The two goose-necks merely divide the work which was done by one before, and they do it in the same manner, merely with less intensity. It is well known to mechanics that by connecting two vessels containing gases or vapors by two or more conduits or passages a less violent flow of the gas or vapor from one vessel to the other is secured than when only one connecting conduit is employed, and this principle has been employed for many years in analogous structures—for instance, in steam boilers by connecting steam drums with the boiler proper in which the water is boiled, and for the same purpose—that is, for the purpose of distributing the exhaust which is created in this case by the withdrawal of the steam from the steam drum—the result being that when the passages are numerous the exit of the steam is facilitated and equalized and the liability of the steam to carry water with it is reduced.

10 Q. In view of the state of the art shown by the exhibits men-

tioned in the fourth question, please state whether or not you
202 find the fourth claim of said complainant's patent novel, and
give your reasons fully for such conclusions as you may
state.

A. The fourth claim contains as its elements a retort, an exhaust pump, a condensing coil, and a capacious condenser interposed between the pump and the retort in such manner that it operates as a check to diminish the direct action of the exhaust pump upon the oil in the retort. The distinguishing feature of this claim is the capacious condenser, which is, in substance, an enlargement of the conduit in which the vapors are condensed, and which is made so large that it will hold a considerable volume of vapor, so that when the pump draws the void created by the volume of vapor which is drawn into the pump is supplied from the vapor contained in the enlarged condenser and not directly from the retort. The pump, therefore, supplies itself with gas or vapor from the enlarged condenser through the condensing coil and connecting passages, and the enlarged condenser in turn supplies itself from the retort through the goose-necks. It is obvious that any enlargement in the condensing coil or in the passages leading to or from the condensing coil and located between the pump and the retort will have the same effect in proportion to the capacity of such enlargement as compared with the pump.

In Defendant's Exhibit G, patent to Gengembre, I find an enlargement between the pump and the condensing coil, which enlargement necessarily operates as a check to diminish the direct action of the exhaust pump upon the contents of the retort, and I find another such enlargement between the condensing coil and the retort.

The first-mentioned enlargement is used as a washing vessel and the enlargement last mentioned, which is located between the con-
densing coil and the retort, is used as a condenser, in which
203 the easily condensed material is collected and from which it
is discharged continually by a trapped pipe. I find, therefore, in this patent the combination of a retort, an exhaust pump, a condensing coil, and an enlarged condenser interposed between the pump and the retort and serving as a check to diminish the direct action of the exhaust pump upon the contents of the retort, as specified in the fourth claim of the complainant's patent.

In Defendant's Exhibit S, English patent to Hamilton, I find a combination of a retort, an exhaust pump, a condensing coil, and a enlargement or vessel located between the tail of the coil and the pump. Two such vessels are shown on the drawing, one above the other. They operate as receivers for the distillate, and the pump is connected with them so that the exhaust is first applied to these vessels and then to the coil and retort. These vessels necessarily operate as a check to diminish the direct action of the exhaust pump upon the contents of the retort.

Adjourned to July 23, 10 a. m.

JULY 23, 1883—10 a. m.

Met pursuant to adjournment and adjourned to July 30th, 10 a. m..

JULY 30—10 a. m.

Met pursuant to adjournment and adjourned to August 6, 10 a. m.

AUGUST 6—10 a. m.

Met and adjourned to August 13, 10 a. m.

AUGUST 13—10 a. m.

Met pursuant to adjournment and examination proceeds.

204 Examination of the witness, EDWARD WILHELM, continued: tinued:

11 Q. In view of the state of the art shown by the exhibits mentioned in the fourth question, please state whether you find the fifth claim of said complainant's patent novel, and give your reasons for such opinion as you may state.

A. The fifth claim of the complainant's patent involves as its elements the condenser, the vacuum pump, and receiving vessels in which the oil is collected as it flows from the condenser, and which are arranged below the level of the tail pipe of the condenser and between the tail pipe of the condenser and the pump, so that the distillate flows from the tail pipe of the condenser by gravity into these receiving vessels without passing through the pump.

I find in Defendant's Exhibit H the same combination and arrangement of parts—that is, a condenser, receiving vessels for the distillate arranged below the level of the tail pipe of the condenser, so that the distillate flows from the condenser into the receiving vessels by gravity, and an exhaust apparatus connected with the upper portions of these receiving vessels in such manner that the distillate flows into these receiving vessels by gravity without passing through the exhaust apparatus; the exhaust apparatus which is described and shown in this patent is a steam siphon, but the specification of the patent states that the vacuum may be produced by means of an air pump or a water column instead of the device which is illustrated in the drawings and particularly described in the specification.

I find the same combination and arrangement of parts in Defendant's Exhibit S, which also shows and describes receiving 205 vessels for the distillate arranged below the level of the tail pipe of the condenser and an exhaust pump connected by pipes with the upper portions of these receiving vessels, so that the distillate flows by gravity from the condenser into these receiving vessels without passing through the pump. I find substantially the same combination and arrangement of parts in Defendant's Exhibit G, in which the outlet for the distillate is constructed in the form of a trapped pipe and arranged below the level of the tail pipe of the condenser and arranged between the condenser and the pump, so that the distillate flows by gravity from the condenser through the trapped pipe into the receptacle provided for it without passing through the pump. This last-mentioned exhibit shows the relative arrangement of the outlet for the distillate with reference to the condenser and the pump specified in the fifth claim of the complainant's patent, but it does not show receiving vessels for the distillate forming part of the exhausted passages, as specified in complainant's patent.

I find substantially the same combination and arrangement of parts in Defendant's Exhibit I, which shows and describes receiving vessels for the distillate arranged below the tail pipes of the condenser and an exhaust apparatus, which may be a steam jet or an air pump, connected with the condenser on one side so as to exhaust the vapors from the receiving vessels, tail pipes, condensing pipes, and still, the whole arrangement being such that the distillate flows through the several tail pipes of the condenser by gravity into the receiving vessels without passing through the pump. In the apparatus described and shown in this exhibit the exhaust apparatus is connected with the passage or chamber through which the uncondensed vapor or gas finally escapes from the condenser, and the arrangement differs in this respect from that shown in 206 complainant's patent, in which the exhaust apparatus or pump is connected with the upper portions of the receiving vessel by a pipe provided with two branches, which are distinct and separate from the pipes through which the distillate is conducted from the condenser to these receiving vessels. The arrangement of parts shown and described in Exhibit I also differs in this respect from the arrangement of the corresponding parts shown in the model in which the pump is connected by pipes directly with the pipes through which the distillate is conducted from the condenser to the receiving vessels. I do not consider these differences as material, because they do not, in my opinion, change the general operation of these parts.

12 Q. In your examination of the model, Exhibit Model Defendant's Vacuum Still, do you find any showing whatever of the matter of the sixth claim of the complainant's patent?

A. I do not.

13 Q. In view of the state of the art shown by the exhibits mentioned in the fourth question, please state whether or not you find the seventh claim of said complainant's patent novel, and give your reasons for such opinion as you may express.

A. The seventh claim, as I understand it, covers broadly the combination of a vacuum still for petroleum with a steam generator and a superheating furnace, in which the steam is heated after it leaves the generator and before it is utilized in the vacuum still. I find substantially the same combination of parts in Defendant's Exhibit K, which shows and describes an apparatus for distilling fatty bodies in vacuo, involving the use of a retort, a condenser in which the vapors coming from the retort are condensed, and an exhaust 207 pump, by which a partial vacuum is created and maintained in the condenser, the retort, and connecting passages. Combined with this distilling apparatus is a superheating furnace, which receives steam from a separate steam generator not shown in the drawing and in which the steam is heated before it is injected into the retort. The specification states that the steam boiler is placed as closely as possible to the furnace of the superheater, and in describing the pipe which leads to the superheater the specification states that the pipe serves for the introduction of the steam from the boiler into the worm of the superheater. The specification states that the apparatus is used for distilling neutral fats and fat acids, which is a different use from that for which the apparatus described and shown in complainant's patent is designed; but I do not consider this difference in the use of the apparatus as a material difference, because in both cases the apparatus involves the use of the same elements or structural parts in the same manner, the difference existing only in the material which is heated in the apparatus.

Adjourned to August 14, 9 a. m.

AUGUST 14, 9 A. M.

Met pursuant to adjournment and examination of witness WILHELM continued.

The witness proceeds:

Defendant's Exhibit H describes the use of superheated steam in connection with a vacuum still for petroleum and embodies the combination of parts mentioned in the seventh claim. The drawing shows and the specification describes the still, the condenser, vessels for receiving the distillate from the condenser, and an exhaust apparatus for creating a vacuum in these parts. A steam heating apparatus is employed in the still, and the specification describes 208 particularly that superheaied steam is employed in the distillation and the advantages resulting from the employment of superheated steam.

The specification does not describe the steam generator and the superheater, and the drawing does not show these parts of the apparatus, but these parts were well known prior to the date of this patent, both separately and in connection with vacuum and petroleum stills. Defendant's Exhibit J shows a superheating furnace in combination with an oil still. In this exhibit the superheater consists of a coil of pipe arranged in a furnace near the still, and the heated steam is conducted into the still by a perforated pipe. Defendant's Exhibit D shows a superheating contrivance combined with an oil still. In this case, the pipe through which the steam is conducted from the boiler to the retorts is arranged in the chamber in which the retorts are placed, so that the steam is superheated before reaching the retorts by the same fire which heats the retorts.

Defendant's Exhibit K shows and describes a superheater in connection with a vacuum still, as I have before explained.

Defendant's Exhibit Q also describes the employment of superheated steam in connection with a vacuum still for petroleum. The steam boiler and superheater are not described or shown in this exhibit, but the exhibit necessarily implies the presence of these parts, as they are indispensable when superheated steam is used.

Defendant's counsel offers in evidence printed Patent Office copy of the specification and drawings of letters patent of the United States to Isaac Newton for improvement in superheating apparatus, dated May 15, 1866, No. 54757, and the same is received in evidence and marked Defendant's Exhibit U, C. H. B., Sp'l Ex'r.

Objected to as incompetent and immaterial.

209 Complainant's counsel waives any objection for want of certification.

Defendant's counsel also offers in evidence a copy of the drawings of letters patent of the United States to W. Elmer for manufacture of gas, dated September 15, 1863, No. 39905, and the same are received in evidence and marked Defendant's Exhibit V, C. B. H., Sp'l Ex'r.

Same objection and waiver.

Defendant's counsel offers in evidence a copy of the drawing of letters patent of the United States to J. A. Bassett for making oil and water gas, dated July 8, 1862, No. 35807, and the same is received in evidence and marked Defendant's Exhibit W, C. B. H., Sp'l Ex'r.

Same objection and waiver.

It is argued by the counsel for the respective parties that certified copies of the specifications of the two last-named patents may be filed with the examiner at any time before the proofs in this case are finally closed.

Defendant's counsel offers in evidence a certified copy of reissue letters patent of the United States to John Howarth, dated January 19, 1864, No. 1605, for improvement in method of distilling coal, etc., and the same is received and marked Defendant's Exhibit X, C. B. H., Sp'l Ex'r.

Objected to as incompetent and immaterial.

Defendant's counsel offers in evidence a certified copy of letters patent of the United States granted to M. Werk, dated Oct. 5, 1858, No. 21711, for improvement in apparatus for manufacturing fatty acids, and the same is received and marked Defendant's Exhibit Y, C. B. H., Sp'l Ex'r.

Same objection.

14 Q. Have you read the testimony contained in the com-
210 plainant's opening proofs of Walter Groves, relating to the construction of the superheater and other parts of the apparatus used therewith, stated by him to have been used by the defendant in this case?

A. I have.

15 Q. Referring to the model mentioned in the testimony of said Groves, I call your attention to the ninth claim of complainant's letters patent and ask you whether, having in view this model and the description of apparatus given by Groves, you find in said model and description, or either of the same, the construction of superheater claimed in the ninth claim of said complainant's patent, and give your reasons for any conclusions you may state.

A. The construction of a superheater set forth in the ninth claim of complainant's patent involves the use of several coils of pipe, ar-

ranged side by side in the superheating furnace and each composed of several pieces of straight pipe connected at their ends by return bends. These several coils are attached to a steam chamber composed of two compartments, one arranged above the other, and the upper ends of the several coils are attached to and open into the upper compartment, while their lower ends open into the lower compartment. The coils are attached to the inner walls of these compartments by lock nuts, two on each pipe, one bearing against the inner side and one against the outer side of the inner wall of the compartment, so that upon releasing these lock nuts at both ends of the coil each coil can be separately detached from the steam chamber without disturbing the coil otherwise and be withdrawn from the superheating furnace through its door when this is required for repairing the coil. In the model referred to in the question the several coils of pipe in the superheater are attached to larger pipes arranged one behind the other, and the upper and lower pipe of
each coil is bent from an inclined position nearly horizontal
211 to a vertical position and screwed into the adjacent larger
pipe, as specified in the testimony referred to. In the construction set forth in complainant's patent and mentioned in the ninth claim the steam chamber to which the coils are attached is located outside of the superheating furnace, where it is readily accessible for repairs, and the two compartments of the steam chamber are arranged one above the other, so that the upper and lower parts of each coil can be made of straight pipe. In the model the two steam pipes to which the opposite ends of each coil are secured are arranged within the superheating furnace, where they are not accessible, and the upper and lower pipes of each coil are bent and screwed into the under sides of these steam pipes, so that it is impossible to detach one of these coils without first tearing up the brickwork and then dismembering the coil to be renewed, if it can be removed at all. I do not, therefore, find in this construction the facility of building and repairs mentioned in the ninth claim of complainant's patent and found in the construction set forth in said claim and described in the specification and shown in the drawing, and I do not find that the construction represented by the model contains the numerous sections of small straight pipe mentioned in the ninth claim, but that, on the contrary, the coils in the model seem to be composed both of straight and bent pipes. For these reasons the construction of the superheater represented in the model and described by the witness Groves does not contain the invention set forth in the ninth claim.

16 Q. I call your attention to the eighth claim of complainant's patent, and I ask you whether you have been able to arrive at a satisfactory construction as to what features or combinations are embraced by the words of said claim.

A. The claim is very ambiguous in its language and does
212 not express any elements, except those which are mentioned
in the seventh claim, neither more or less—that is, it combines the superheating furnace with a steam boiler and a vacuum petroleum still. The claim seems to lay stress more upon the par-

ticular construction of the superheating furnace than upon the combination of the several elements enumerated in the claim. The first element recited by the claim is "the construction of said superheating furnace." Now, the meaning of this phrase appears from the ninth claim, which specifies what the construction of the superheater is, and I am of the opinion that a superheater constructed as set forth in the ninth claim is the first element mentioned in the eighth claim. The remaining elements of the claim are the steam boiler and the vacuum petroleum still, which are the same elements mentioned in the seventh claim. I understand that the eighth claim has been read as if the opening in, whereby the waste heat from the superheating furnace passes into the boiler flues, were an element of such claim, but it is very clear that this element is not expressed in the claim, and I find no authority in the language of the claim for injecting this element into the claim.

17 Q. What do you find in the state of the arts contained in the exhibits put in evidence on the part of the defendant which has in your opinion, a bearing on the construction to be given to the eighth and ninth claims or either of them? State fully and state any conclusions or inferences in the elucidation or interpretation of these claims or either of them which you draw from the said exhibits.

A. In Defendant's Exhibit U, I find described and shown a superheater having numerous sections of small straight pipes with facility of building and repairs. In this exhibit the superheater is provided with a steam chamber composed of two compartments, and each superheating pipe is composed of an outer pipe secured
213 in the wall of one of the compartments and an inner pipe
secured in the partition wall dividing the two compartments, the steam inlet and outlets being so arranged in the two compartments that the steam enters the inner pipe and passes through the same, and into and through the annular space between the two pipes back into the other compartment. This superheater is arranged in a case which has a door opposite the ends of the pipe, so that each pipe can be readily removed by detaching it from the steam chamber. It was, therefore, not broadly new prior to complainant's patent to construct a superheater with numerous sections of small straight pipe with facility of building and repairs.

Defendant's Exhibit V shows the combination of a retort, a steam boiler, and a superheater in such manner that the steam is generated and superheated by the waste heat escaping from the furnaces of the retort.

Defendant's Exhibit W shows the combination of retorts with a steam boiler and a superheater in such manner that the steam is superheated before it enters the retorts by the waste heat of the retort furnace. It is not clear from the drawing of this exhibit where the hot products of combustion find their outlet after passing through the superheater. I have not examined the specification of this patent, and am unable to say whether the hot gases pass from the superheater into the boiler flue or not.

Defendant's Exhibit X shows and describes a combination of an oil still or retort and a separate superheating furnace in which the superheating coil is composed of numerous sections of straight pipes connected by return bends; the ends of the pipes and the return bends are provided with flanges, which are evidently secured together by bolts so that the several sections composing the coil can be separated when required. In Complainant's Exhibit Y 214 the combination of a steam boiler, a superheating furnace, and a still is shown. The superheating pipes are constructed in the form of a coil composed of numerous sections of straight pipes connected by return bends. In this case the straight pipes and bends are evidently connected by screw threads.

Recess until 2.30 p. m.

2.30 P. M.

Same appearances.

Examination proceeds:

18 Q. Please state whether or not you find the matter of the tenth claim of complainant's patent shown in the model marked Exhibit Model Defendant's Vacuum Still.

A. I do not.

19 Q. State whether or not you find the matter of the eleventh claim of complainant's patent shown in said model, and give your reasons for the conclusions you may state.

A. I do not find the construction set forth in the eleventh claim in the model referred to in the question. The construction of the heating pipes in the still described and shown in complainant's patent and referred to in the eleventh claim involves the use of a number of sections of heating pipes arranged side by side in the still. The longitudinal pipes of each section are placed one above the other, so that one end of each section connects with the upper compartment of the steam chamber and the lower end of each section with the lower compartment of the steam chamber. Each section may be composed of two pipes connected by a return bend, as represented in figure four of the drawing, or it may be composed of four pipes, as represented in figure six of the drawings, and in either case each section is placed vertically in the still, so that the horizontal members of each section stand in a vertical plane 215 one above the other. The object of this arrangement is very apparent, because it enables the two ends of each section to be connected, respectively, with the two compartments of a steam chamber which is divided horizontally, thereby admitting the steam simultaneously from the upper compartment of the steam chamber to the upper ends of all the sections or coils and permitting the steam to escape simultaneously from the lower ends of all the sections into the lower compartment of the steam chamber. In the model I do not find any such sections of heating pipes as are specified in the complainant's patent and mentioned in the eleventh claim. The heating device represented in the still of the model is an ordinary steam coil, the horizontal members of which are arranged in several rows, one above the other, and connected by return bends, some of which stand vertically and some horizontally. There is no divided steam chest with which the vertical sections are connected, so that the steam flows through all of them simultaneously, but the steam is received into the coil at one end and discharged therefrom at its opposite end, so that the steam passes through all the parts of the coil successively. The characteristic feature of the patentee's construction, which consists of a series or number of sections or coils arranged side by side in the still in an upright position, is not contained in the single coil represented by the model, and the coil in the model differs essentially, both in its construction and mode of operation, in the respects above mentioned, from the construction shown and described in complainant's patent and set forth in the eleventh claim thereof.

20 Q. What do you find in the state of the art, as shown by the exhibits put in evidence on the part of the defendant, bearing on the device to which this eleventh claim relates and affecting its novelty?

216 A. Defendant's Exhibit P describes and shows an oil still in which the same system of heating pipes is used which is described and shown in complainant's patent and mentioned in the eleventh claim. In this exhibit the heating pipes in the still are composed of sections, each consisting of two horizental straight pipes and a return bend connecting two ends of the pipes; the opposite ends of the two pipes of the same section connect with two manifold heads or main pipes, through one of which the steam is supplied to all of the sections. After passing through the several sections the steam escapes therefrom into the other manifold head. Two series of such sections are arranged one above the other in the still, and they are supplied with steam from manifold heads or pipes located at both ends of the still. While this heating device has the same characteristic feature which is found in the complainant's patent and which consists of a series of heating sections or coils arranged side by side, receiving steam from the same supply and discharging into the same exit, it differs from that shown in the patent and mentioned in the eleventh claim thereof in the arrangement of the pipes composing each section, which are arranged side by side in a horizontal plane in Exhibit P, and one above the other in a vertical plane in the patent.

21 Q. In your opinion, what degree of invention, if any, would be involved in the mere change in these pipes from horizontal to vertical relations?

A. The horizontal arrangement of the pipes being known, it would be a very obvious change, not requiring invention, to arrange the members of each section or coil one above the other as they are in the patent.

22 Q. I ask your attention to the twelfth claim of the complainant's patent, and I ask you to state whether in view of the
217 exhibits put in evidence, referred to in the fourth question,
you find this claim novel, and if not novel upon what grounds and for what reason it is wanting in novelty.

A. If the claim is read broadly for the application of an ordinary liquid gauge to a vacuum petroleum still in the ordinary manner in which such gauges are applied to stills and other vessels contain-liquids, it is merely for the ordinary and well-known use of an ordinary and well-known contrivance, because the function of the gauge is merely to indicate the level of the liquid in the vessel to which it is attached. Stills provided with such oil gauges are shown in defendant's Exhibits I, N, O. I am, however, of the opinion that the words "arranged and operating substantially as set forth," contained in the twelfth claim, limit the claim to a gauge in which the pipes connecting the upright transparent pipe with the retort run through a body of water for cooling the liquid which enters the gauge, as set forth in the specification and shown in figure I of the drawing.

23 Q. Under this latter construction which you have mentioned of claim twelve, state whether or not you find the substance of said claim shown in the said model, Complainant's Exhibit Model Defendant's Vacuum Still, or described in the deposition of said Groves above referred to.

A. I do not find the subject-matter of the twelfth claim in said model or deposition unless the claim is read as broadly as I have indicated in the first part of my last answer.

24 Q. State whether or not you find the subject-matter of the thirteenth claim shown in the said model as stated by said witness Groves in said deposition, and give your reasons.

218 A. I do not find the subject-matter of the thirteenth claim in the model nor in the description of the apparatus given by the witness Groves. The claim embraces as its elements a steam generator, a superheating furnace, and a vacuum apparatus as a whole, constructed and operating substantially as set forth in the specification and illustrated in the drawings. The vacuum apparatus referred to in the claim consists of two or more stills, which are so combined with each other that while the lighter hydrocarbons are being distilled from the crude petroleum in one of the stills the heavier portions of the oil are being distilled in the other, and the oil is fed from one retort into the other, whereby the operation of distilling is made more continuous than it would be if a single still were used, and the heating apparatus, whereby the contents of the several stills are heated, is so arranged with reference to the several stills that the superheated steam passes first through the heating pipes in the retort containing the least volatile portions of the petroleum, which requires the greatest degree of heat, and then through the pipes in the next retort containing lighter and more volatile portions of petroleum, which can be distilled off at a lower temperature. The employment of two or more retorts and the peculiar manner in which the oil is fed from one to the other and the steam passed from one to the other in an opposite direction are the peculiar and characteristic features contained in the apparatus described and shown in complainant's patent, and in speaking of this apparatus as a whole, as the thirteenth claim does, these characteristics must be taken into consideration. In the model and in the deposition referred to in the question a single retort is used in the

ordinary manner in which such retorts are used in distilling petroleum, and the operation is necessarily intermittent, as the petroleum is not fed from one retort into another, and the superheated steam is used in but one heating coil and not taken successively
219 through the several heating coils of several successive retorts.

The apparatus represented by the model does not, therefore, present the characteristic features which distinguish the patented apparatus from others, and a claim for the patented apparatus as a whole, like the thirteenth claim in the patent, does not, in my opinion, embrace an apparatus like that represented in the model, which contains only parts of the patented apparatus, old in themselves, and which does not operate like the patented apparatus.

Adjourned to August 15, 9 a. m.

AUGUST 15—9 a. m.

Cross-examination by GEO. B. SELDEN, Esq., complainant's counsel:

25 Q. Have you had any practical experience in the manufacture of petroleum oils?

A. No, sir.

26 Q. Have you examined the defendant's vacuum still when in operation?

A. No, sir.

27 Q. In the patents of Gengembre and of Hamilton, defendant's Exhibits G and S, the pipes which you have called goose-necks are connected together so as to form a single passage into the condensing apparatus, are they not?

A. They are.

28 Q. Does the Gengembre patent describe an apparatus which, in your opinion, could be used in the manufacture of petroleum oils without material modifications?

A. No, sir.

220 29 Q. Do you find in the Hamilton patent the receiving vessel or condenser placed between the condensing worm and the retort?

A. No, sir.

30 Q. In the Gengembre patent the arrangement is such that the gases discharged from the oil pump are returned directly to the retort, is it not?

A. Yes, sir.

31 Q. In the Reese patent, Defendant's Exhibit A, the retort is provided with vertical partitions extending from the top nearly to the bottom thereof, so as practically to form a series of chambers in the retort which have no communication with each other, except below the upper surface of the oil when the retort is full, is it not?

A. Yes, sir.

32 Q. And in the Reese patent the retort is heated by the direct application of fire to its lower side, is it not?

A. Yes, sir.

33 Q. Do either the Gengembre or the Hamilton patents show an

elongated retort arranged horizontally and parallel to an elongated receiver with a series of goose-necks connecting the retort with the receiver and forming independent passages between the two, in a manner substantially like that shown and described in the complainant's patent and illustrated in the complainant's model in this case?

A. No, sir.

34 Q. The condensing apparatus in the Reese patent is an ordinary worm, is it not?

A. I do not find that the construction of the condensing apparatus is particularly described or illustrated in the Reese patent, and I conclude that he means to employ a condensing apparatus of the construction usually employed in oil stills—that is, a coil or worm.

221 35 Q. Do you find in the Gengembre patent a condensing worm arranged underneath a receiving vessel, so that any liquid condensed in the receiving vessel would flow by gravity directly into the worm, as represented in complainant's patent and in the model?

A. No, sir.

36 Q. Do you find in the Gengembre patent that the receiving vessel is located within a water tank, or otherwise provided with any means for reducing its temperature?

A. The receiving vessel is not located within a water tank; its temperature is reduced by the surrounding atmosphere.

37 Q. Supposing that the drawings in the Gengembre patent are made to a scale, what in your opinion would be the relative volumes of the receiving tank *r* when filled with liquid to the upper part of the siphon S and the L-shaped retort?

A. It is impossible to say what this relative proportion may be, because only two dimensions of the receiving vessel *r* are shown in the drawing. The vessel may be square, round, or oblong, and its form does not appear from the drawing. The L-shaped retort is evidently round in cross-section. Upon the supposition that the vessel *r* is round also, and without measuring the parts, I should judge that the proportion of the volume of gas contained in the receiving tank *r* above the liquid to the entire contents of the L-shaped retort would be in the neighborhood of one to twenty.

38 Q. Do you find in any of the defendant's exhibits an independent superheating furnace constructed alongside of a steam generator in such manner that the hot gases from the fire in the superheating furnace pass through the flues of the steam generator, where they assist in generating steam, as described in complainant's patent and illustrated in complainant's model herein? 222

A. No, sir.

39 Q. Referring to the Gilbee patent, Defendants' Exhibit K, what means are shown therein for introducing steam into the fats in the retort?

A. A pipe which extends from the superheater to the top of the retorts and opens near the bottom thereof.

40 Q. Then the only means shown in the Gilbee patent for apply-

ing the heat of the steam to the fats in the retort is the direct discharge of the steam into the fats, is it not?

A. No, because the heated pipe through which the steam is introduced also operates as a heating device.

41 Q. The apparatus described in the Gilbee patent would require the use of three several heating furnaces, one for the steam generator, one for the superheater, and one for heating the still B, would it not?

A. No; the still is heated by the waste heat from the superheater.

42 Q. Please read from the specification of the Gilbee patent the sentence commencing after the words "description of the drawing."

A. "A furnace with two compartments, each provided with a fireplace and ash-box; in the first compartment is a worm composed of a double row of iron pipes, *a a*, arranged between two vaults; in the second compartment is placed the still B with its compartments *a a a a*, worm for superheating the water vapor or steam necessary for the distillation, the water being supplied from a steam boiler placed as close as possible to the furnace A; *b*, pipe with a cock for the introduction of the steam from the boiler into the worm *a a a a*.

223 43 Q. Do you understand the construction and operation of the air pump shown in the Gilbee patent? And, if so, please describe the same.

A. The specification and drawing of the patent do not explain the construction and operation of the air pump in detail as a device, but only in connection with the other parts of the apparatus. I cannot say, from an inspection of the drawing, what the particular construction of the air pump is which is shown therein; the specification describes it as an air pump for extracting the gas, and that it is in communication with the lower part of the condenser.

44 Q. Does the patent to Tweddle, Defendants' Exhibit H, show or describe a steam generator and an independent superheating furnace arranged to superheat the steam from the generator?

A. The drawings do not show the steam generator and the superheater, but I think the specification must be taken as describing these parts, because it describes the employment of superheated steam in a vacuum still, and the presence of the generator and the superheater follows, from this description, as a necessary consequence. The still is a steam still on which no external fire is used, and the heat for superheating the steam would necessarily be generated in a separate furnace, because the aim of the invention is to keep the steam pressure as low as possible; in order to do this the waste gases from the steam boiler would have to be discharged at a low temperature, so that the superheating could not be effected by the waste gases of the steam boiler, but would have to be effected by an independent superheating furnace, which was a well-known contrivance when this patent was issued.

45 Q. Does not the model herein contain the combination of a steam generator, superheating furnace, and vacuum apparatus constructed and arranged so as to be jointly capable of practical
224 use as a whole in the manufacture of petroleum oils?

A. It does.

Redirect examination by JAMES A. ALLEN, Esq., defendant's counsel:

46 Q. In the 38th cross-question reference is made to flues of the steam generator assisting in generating steam, as illustrated in complainant's model herein. Do you find in that model any illustration of the flues or interior furnace of the boiler?

A. I do not.

47 Q. Please make any explanation you deem proper in connection with the 41st and 42d cross-interrogatories and your answers thereto.

A. In answering the 41st question I had reference solely to the drawing of the Gilbee patent, Exhibit K, which shows plainly that the retort is set in the flue through which the waste gases escape from the superheating furnace. By reference to the specification I find the drawing is misleading in this respect and that the section of the superheating furnace and retort shown in the drawing must have been taken in two different planes, one being laid through the superheating furnace and the other through the retort on one side of the superheating furnace.

48 Q. Referring to the 33d cross-question, which speaks of an elongated retort arranged horizontally and parallel to an elongated receiver with a series of goose-necks connecting the retort with the receiver and forming independent passages between the two, please state whether such a construction is exhibited in the specification and drawings of complainant's patent.

A. It is exhibited in figure 5 of the drawing and described in the specification as a modification of the construction which is
225 represented in figures 1 and 3, in which a separate enlargement is interposed between each of the goose-necks and the condensing coils.

49 Q. I quote from the specification: "From the tops of the retorts, respectively, passes a series of goose-necks, B B and B′ B′, connecting with [corresponding series of capacious condensers C C and C′ C′ submerged in a water tank, D," and I ask whether or not these condensers, C C and C′ C′, are not shown in the drawing, each having its separate several goose-necks connecting thereto.

A. They are shown each with a separate goose-neck connected thereto.

50 Q. Assuming that the coal-grinding device marked *m* in Exhibit G were removed, do you know any reason why, without modification, the Gengembre device could not be successfully applied to the manufacture of petroleum oils?

A. If the spout *d* were closed also and the retort be made practically tight I think it could be so used.

Recross-examination by GEORGE B. SELDON, Esq., complainant's counsel:

51 Q. Does the specification of the Gengembre patent in any way indicate that the patentee contemplated the application of his apparatus to any other substances than oleiferous minerals, such as "shale, bituminous slates, cannel coal," etc.?

Objected to on ground that the patent shows for itself.

A. It does not.

52 Q. Do you think that a practically effective vacuum could be maintained in an apparatus in which the gases discharged from the pump were returned directly to the retort?

226 A. No. In that case the pump operates more as a circulating pump, and not as a vacuum pump.

53 Q. Does not figure 5 of the drawings of plaintiff's patent, when examined with reference to the passage of the specification commencing at the seventh line from the top of the second column of page 2, which says, "Instead of the upright form of the condensers indicated in figure 1 the horizontal elongated form indicated in figure 5 may be employed," show two or more of the goose-necks, B B and B′ B′, each connected directly with the horizontal elongated condenser?

A. It does.

EDWARD WILHELM.

Sworn to before me this 14th day of August, 1883.
CHARLES B. HILL, *Spec. Ex'r.*

It is stipulated that the complainants may have until the first day of December, 1883, in which to make their rebutting proofs in this case.

CHARLES B. HILL,
Special Examiner.

UNITED STATES OF AMERICA,
Northern District of New York, } *ss:*

I, Charles B. Hill, appointed a special examiner of this court by an order therein made and entered with the clerk thereof on or about the 21st day of April, 1883, in this cause, wherein the Vacuum Oil Company is complainant and the Buffalo Lubricating Oil Company, Limited, is defendant, do certify that I was attended at the office of James A. Allen, Esq., in the city of Buffalo, in said district, on the 10th day of July, 1883, and on such other days as are mentioned in the annexed deposition, by James A. Allen, Esq., of counsel 227 for the defendant, and by George B. Selden, Esq., and Thomas G. Outerbridge, Esq., as counsel for the complainant, and by the witness, Edward Wilhelm, whose deposition is hereto annexed; that the said witness, being of sound mind and lawful age, was first by me sworn to testify the truth, the whole truth, and nothing but the truth in said cause, and was then carefully examined; that said witness did thereupon depose as appears in his foregoing deposition, which was reduced to writing in the presence of said witness and was read over to said witness and signed by him as and for his deposition in my presence and in the presence of said counsel.

I further certify that I am not of counsel or attorney to either of the parties to said cause nor in any way interested in the event thereof. I further certify that in the taking of said evidence I have complied in all respects with the requirements of the 67th rule, in equity, as amended, of the Supreme Court of the United States, and I herewith transmit such evidence, with all the exhibits therein referred to, to the clerk of the court in which said cause is pending.

Witness my hand this 14th day of August, 1884.

CHARLES B. HILL,
Special Examiner.

228 OCTOBER 15, 1884—10 a. m.

Appearances: James A. Allen, Esq., for defendant, and Thomas G. Outerbridge, Esq., for complainant.

EDWARD WILHELM, recalled by defendant's counsel, testified as follows:

1 Q. Have you read the testimony of the complainant's expert, Rufus F. Osgood, taken as rebutting testimony in this cause before Examiner Cronise?

A. I have.

2 Q. With reference to the third claim in complainant's letters patent, state whether or not you adhere to the conclusions stated in your former deposition in this cause, and review, so far as you deem it proper to do so, the reasons assigned by the complainant's expert for differing in opinion with you, making such corrections of Mr. Osgood's statements relating to this claim as you deem material.

A. I still adhere to the conclusions which I have previously expressed as to the third claim.

In summing up the essential features which enter into the combination of the third claim, Mr. Osgood mentions, " first, a horizontal and elongated retort which allows the oil to be spread over considerable surface to receive the best action of the heat." I find that neither the third claim nor the corresponding statement of invention impose this limitation, but that the claim is broadly for " the retorts of a vacuum still " as an element and not for a combination in which a retort of the peculiar construction mentioned by Mr. Osgood is an element. It is quite clear that a round or kettle-229 shaped retort of considerable diameter, provided with a series of goose-necks, when used in the combination of the third claim, would come quite as much within the language of the claim as a horizontal and elongated retort. The second essential feature of the third claim which Mr. Osgood mentions is " the use of a series of goose-necks, two or more, opening from the retort at given intervals apart, so as to remove the vapor by a direct action from all parts of the retort."

I do not find anything in the specification or drawings of the complainant's patent which shows that the goose-necks should be arranged at given intervals apart, or that they should be arranged at regular intervals apart, as Mr. Osgood says in folio 13. The specification and claim are silent on the subject, and the fact that two goose-necks come within the requirements of the claim and are shown in the drawing shows that this arrangement at regular intervals apart is non-essential, as there is but one interval or space between two goose-necks. The third essential feature of the third claim which

Mr. Osgood mentions is a condenser or condensers into which the opposite ends of the goose-necks open for the purpose of receiving the vapors and condensing the same. I do not think it is essential in this feature that all the goose-necks should open into one condenser, because the patent shows an alternative arrangement which consists in a separate condenser applied to each goose-neck, and for the further reason that if, in the construction represented in figure 5 of the patent, the three goose-necks were not connected directly with the condenser C^1, but were connected to a common trunk or pipe which would open into the condenser C^1, the operation of the apparatus would be precisely the same, and the draft would be distributed over the still or retort in precisely the same manner in either case. The
sole effect of the two goose-necks, as contradistinguished from
230 one goose-neck, is to take the draught at two different places
from the still, and thereby distribute the draught a little more over the surface of the material in the still than it would be distributed if but one goose-neck were used. In other respects a single goose-neck of the same area as the two goose-necks will remove the generated vapors with the same speed and regularity. This distribution of the draught is effected whenever two or more goose-necks are employed and so connected with the pump or exhaust device that the pump will draw from all of them, and this is the case whether the several goose-necks are connected directly or indirectly with a common condenser.

In the Gengembre patent, for instance, the two goose-necks are connected indirectly with the condenser or vessel *r*. The operation of this apparatus would not be materially changed if the pipe *q*, of the upper goose-neck, were continued downward to the condenser *r*, and a separate pipe were employed to connect the lower goose-neck *p* with the condenser *r*. In either case the exhaust apparatus connected with the condenser *r* will draw the vapor from the retort through both goose-necks and thus distribute the draught over the length or, in this case, the height of the retort. The uniformity or regularity of the draught from the retort depends upon the number of the goose-necks and the proportion of the parts, but this is a matter of construction and not of invention. In the Gengembre apparatus the draught is sought to be equalized by making the lower goose-neck, which connects with the larger part of the retort, proportionately larger than the upper goose-neck, which connects with the smaller part of the retort. A good constructor would probably make the part of the vertical pipe *q* which lies below the goose-
neck *p* larger than the upper part of the pipe in order to
231 give the lower part of the pipe sufficient capacity to convey
the volume of vapor which it receives from both goose-necks without an increase of speed, or he would make the upper part of the pipe *q* smaller than the lower part in order to save material and avoid a retardation of the current, but all these things are matters of constructive detail only and do not affect the principle of the apparatus. The fact that the goose-necks in Gengembre are made flaring and larger where they connect with the retort is beneficial, because it reduces the velocity of the currents of the vapor where

they leave the retort, and avoids the violent action of the draughts which would take place if the currents escaped with great speed, and which it is the object of complainant's device to avoid. I am, therefore, still of the opinion that the two goose-necks in the Gengembre patent are the equivalents of the two goose-necks of the complainant's patent, and are used for the same purpose in an analogous combination of parts. I am confirmed in this opinion by the statement contained in the Gengembre specification which is as follows: "The tower retort *g* has two or more exits, *p p*, at different points to equalize the discharge of the volatile products and allow them to pass off without remaining longer than necessary exposed to the heat of the retort which would tend more or less to convert them into permanent gas."

Mr. Osgood seems to think that the equalizing action spoken of in the specification of Gengembre will not take place so perfectly in the actual operation of the apparatus as to produce precisely the same draught through each goose-neck, because the lower goose-neck is nearer the point of suction than the upper goose-neck, and this is probably true, but the same is true of the Everest patented construction, in which the draught through the different goose-necks will also be proportionately stronger in the goose-necks which
232 are nearest the point of suction, and especially so if the worm is connected with one end of the condenser, to which all of the goose-necks are connected, and which may be done as Mr. Osgood testifies at folio 191.

As to the English Hamilton patent I infer from Mr. Osgood's statement in folio 24 that he is of the opinion that but one of the several goose-necks or vapor-escape pipes is used at a time and that there is no duplication of goose-necks in the apparatus as actually used. If this is his understanding of the Hamilton patent he is in error, because the main pipe K, which connects the worm with the upper portion of the still, is not provided with a stop-cock, as is apparent from the drawing and description of the apparatus, which latter describes only the branch pipes K K^1 K^2 as being provided with stop-cocks. If, therefore, one of the branch pipes K K^1 K^2 is open, in the use of the apparatus, the draught is taken through two goose-necks from two different points of the still and distributed to that extent.

I have before said that I do not regard the form of the still or retort as an essential feature of the third claim, and I may add that I do not regard the construction of the condenser and exhaust device as being made an element of the third claim, but am of the opinion that any suitable condenser and any suitable exhaust device answers the requirements of the third claim. The Ewing patent, Defendant's Exhibit Q, shows the connection of the retort of a vacuum still with the condensers by two or more goose-necks, and contains, therefore, all of the elements mentioned in the third claim, combined in the same manner and operating like the corresponding combination of the complainant's patent, excepting, perhaps, that the draught of the Ewing patent is not distributed over so large a surface as in complainant's construction, which results from the difference

233 in the form of the retorts. If the diameter of the retort in the Ewing patent were enlarged the draught would be distributed over a larger surface. I regard this difference as immaterial, because it only affects the degree or extent of the distribution of the draught, while the fact that a certain distribution does take place exists in both the complainant's patent and the Ewing patent. I do not understand that the alternate use of the two condensers in the Ewing patent is compulsory. The specification states that they may be used alternately if desired, and such use is therefore optional. The specification also states that an air pump might be connected with the condensers. If this direction of the specification is carried out the Ewing apparatus would contain the same arrangement of parts which is illustrated in figures 1 and 3 of the complainant's patent, in which each goose-neck connects with a separate condenser, with the exception of certain immaterial variations, consisting, for instance, in the arrangement of the goose-necks parallel to each other on the same side of the retort, while those in the Ewing patent are arranged on opposite sides of the retort, and which differences do not affect the operation of the parts. It is quite obvious that the two goose-necks and condensers could be used simultaneously in either of the constructions described in the Ewing patent, whether an air pump or jet devices are used, and if they are used simultaneously the Ewing construction embodies the combination of the elements mentioned in the third claim.

I am, therefore, of the opinion that the Ewing patent anticipates the third claim.

As to Defendant's Exhibits E, I, B, K, F, and D, which show only a single goose-neck in the combination of the third claim, I wish to reiterate that I do not regard the substitution of two goose-necks for one as an invention, especially in view of the fact that the
234 distributing or equalizing effect of two or more goose-necks on the draught in the still was well known, as appears from the specification of the Gengembre patent. I am, therefore, of the opinion that these exhibits also anticipate the third claim.

Adjourned to October 16, 9.30 a. m.

OCTOBER 16—9.30 a. m.

Same appearances, and examination of witness Wilhelm proceeds:

3 Q. The drawing by Mr. Osgood, marked Exhibit Z, Osgood's sketch, having been mislaid, and consequently not being present, I desire to ask whether, from the context of Mr. Osgood's rebutting deposition, you understand substantially what that drawing is?

A. I think I understand substantially what said sketch is intended to represent.

4 Q. Please make a sketch, referring to pages 36, 37, 38, 39, 40, and 41 of Mr. Osgood's rebutting deposition, showing in substance Mr. Osgood's sketch as you understand it to have been made by him, marked Exhibit Z.

A. I have made such a sketch and here produce it.

Sketch offered in evidence by defendant's counsel and the same marked "Wilhelm's Duplicate of Osgood's Sketch."

Objected to as incompetent and immaterial.

5 Q. Assuming that the coil marked E′ is connected with the condenser marked C′, in the manner shown in your duplicate of Exhibit Z, what would be the effect of such form of connection upon the regularity and equality of the draught from the exhaust pump made upon the several goose-necks B′, through the condensers C′, as shown?

Same objection.

235 A. The draught would be irregular. It would be weakest through the pipes 3 and the goose-necks standing in line with said pipes, stronger through the pipes 2 and the corresponding goose-necks, and strongest through the pipes 1 and the goose-necks corresponding therewith. The difference in the intensity of the draught through the several goose-necks will be greatest in the construction represented in figure 1, because in this construction each goose-neck is a direct continuation of the small pipe which connects the capacious condenser with the condensing coil, and is not connected with any other goose-neck.

6 Q. What do you say in regard to Mr. Osgood's theory that the differences in the draught of the pump through the pipes marked 1, 2, and 3 might be considerable, but that such differences would disappear in the several condensers C′ and their connecting goose-necks?

Same objection.

A. I do not believe that the presence of the condensers C′ in the construction represented in figure 1 will affect the relative strength of the draught through the several goose-necks in any manner whatever. It is perfectly clear that the pipe marked 1 will draw strongest, and that the condenser C′ and goose-neck B′, connected with said pipe, are amply sufficient in capacity to supply the vapor which is required by the strong draught in the pipe 1. The draught through the condenser C′ and goose-neck B′ is, therefore, correspondingly strong, and the presence of the enlargement or condenser C′ in this vapor conduit merely prevents the draught from taking place with irregular speed or jerks corresponding with the pulsations of the exhaust pump. It does not affect the volume or intensity of the draught. For the same reason the draught through the condenser and goose-necks connecting solely with the
236 pipe 2 is of less intensity than that through the first-mentioned condenser and goose-neck, and that through the goose-neck and condenser connecting with the pipe 3 is still less.

7 Q. Do you find anything in the specification and drawing of complainant's patent to indicate that the connection of the worm E′ with the condenser C′, as shown in figure 5 of such patent, was not intended to be made directly to the end of such condenser?

A. No, sir.

8 Q. Please state whether or not, after reading the deposition of Mr. Osgood bearing upon your testimony and the exhibits in the case relating to claim four of complainant's patent, you find any occasion to change the conclusion stated in your former deposition, and review, so far as you deem proper to do so, the rebutting testimony of the complainant's expert in relation to this fourth claim of the patent.

A. I see no occasion for changing any of the conclusions which I have heretofore expressed as to the fourth claim and the exhibits in this case.

I do not agree with Mr. Osgood when he says that this claim is similar to the third, for it is very evident that the characteristic feature of the third claim consists of the multiplicity of goose-necks, whereby the exhaust is distributed in the retort, while the characteristic feature of the fourth claim consists of the capacious condenser so combined with the retort and the condensing coil that the condenser will serve as a check to diminish the direct action of the exhaust pump upon the oil in the retort. A multiplicity of goose-necks forms no element of the fourth claim. An apparatus with a single goose-neck, having a capacious condenser combined with a retort and the condensing coil to operate in the manner set forth in the claim, answers every requirement of the claim; neither is it necessary 237 that the retort of the fourth claim should be a horizontal elongated retort, or that the capacious condenser should be located between the retort and the condensing coil. It is true the fourth statement of invention imposes this last-named limitation, but the claim does not contain it, and I am, therefore, of the opinion that a capacious condenser located anywhere in the vapor conduit between the pump and the retort, if it serves as a check to diminish the direct action of the exhaust pump upon the oil in the retort, will answer the requirements of the fourth claim. I have explained in my testimony-in-chief why a capacious condenser located anywhere in the vapor conduit will serve as a check to diminish the direct action of the exhaust pump upon the oil in the retort, and I still adhere to that opinion.

Mr. Osgood's statement that the subject-matter of the fourth claim "forms a special construction and arrangement by which the single pump can be made to act upon all the goose-necks at once, the action on each being independent of that upon the other," I do not understand. I cannot see how the action of a single pump upon all the goose-necks at once can produce an independent action on each goose-neck, especially not in the construction represented in figure 5 of the patent, in which the goose-necks communicate with a single condenser and where the action of the pump on one goose-neck is necessarily qualified by its action upon the other.

I do not agree with Mr. Osgood when he says that the vessel *r* in the Gengembre patent is not sufficiently large to operate effectively in the manner in which the capacious condensers of the patent operate. It is quite evident from an inspection of the drawing that the vessel *r* is so much larger than the pipes which connect therewith that it will operate effectively as a check to diminish the di-

238 rect action of the exhaust pump upon the oil in the retorts; or, in other words, to prevent the pulsations of the exhaust pump from being transmitted to the goose-necks and retort. The vessel *r* in the Gengembre patent is located between the condensing coil and the retort, which is precisely the relative arrangement of the parts shown and described in complainant's patent.

I think Mr. Osgood says that the pump in Gengembre is not an exhaust pump, properly speaking, but I see no force in that objection, as it is quite evident that the pump is as much an exhaust pump as it is a force pump.

As to the Hamilton patent, Mr. Osgood says that the pump is constantly drawing through the coils of pipe directly upon the retort. He is evidently in error, because the patent shows that the pump draws upon the enlarged receiver M, and that this receiver in turn supplies itself from the coil and retort. The receiver, being partly filled with gaseous fluids or vapors, necessarily serves as a check to diminish the direct action of the exhaust pump upon the retort. I am of the opinion that the particular location of the enlargement in the vapor conduit between the worm and the retort does not in any manner affect its operation to serve as a check to diminish the direct action of the exhaust pump upon the oil in the retort. Whether it is arranged on one or the other side of the condensing coil it will in either case operate to supply the pump with the necessary volume of vapor or gas and prevent the pump from acting directly upon the goose-necks and retort. The same uniformity of the flow of the vapor through the goose-necks and condensing coil is produced in either case.

9 Q. Please state whether or not you find in the Horner patent, Exhibit J, a description in connection with the retort of an oil still of an enlargement of the conduit from the still to the worm.

239 A. I do. The enlargement is called the prime condenser in the specification, and is described as being made of strong sheet iron about four feet high and two feet in diameter. I notice that Mr. Osgood says that I am mistaken in saying that this patent shows an oil still, but I think that designation of the still is warranted, not only by the title of the patent, which is "Improvement in oil still," but also by the general character and purpose of the apparatus, which is to distill oil from coal and other minerals.

10 Q. After reading the statements in the rebutting deposition of Mr. Osgood relating to the seventh claim of complainant's patent and the patents referred to in your former deposition as showing its want of novelty, please state whether you adhere to your previous conclusion; and, if so, please correct such errors in Mr. Osgood's evidence as you deem it of importance to refer to.

A. I still adhere to my former conclusions as to the seventh claim and the exhibits to which I have referred in connection therewith. The characteristic element of the seventh claim is the independent superheating furnace for heating the steam when used in connection with a vacuum still for petroleum, and a steam generator, as contradistinguished from the same combination of parts in which the heat required for the superheating of the steam is derived, not from an independent furnace, but from some other source. The patent to Tweddle shows that superheated steam had been employed in vacuum stills prior to the date of complainant's patent. The Tweddle patent, therefore, implies the use in combination of a vacuum still for petroleum, a steam generator, and a superheating furnace for heating the steam. Prior to the Tweddle patent superheating furnaces for raising the temperature of ordinary steam, of two kinds, were known:

240 First. Those in which the steam was heated in a coil, which was arranged in a furnace which performed no other function but the one of superheating the steam, and which may be called independent superheating furnaces, in the language of complainant's patent. Superheaters of this class are shown in the patents to Horner, Defendant's Exhibit G; to Werk, Defendant's Y; Howarth, Defendant's Exhibit X; and Gilbee, Defendant's Exhibit K.

Second. Those in which the superheating coil is heated by a furnace which also performs some other function; for instance, the furnace of a retort or a steam-boiler. Superheaters of this kind are illustrated in the patents to Bassett, Defendant's Exhibit W, and to Newton, Defendant's Exhibit U, and Kelly and Tait, Defendant's Exhibit D. It is quite obvious, therefore, that a mechanic, in following the directions of the Tweddle patent, which prescribes the use of superheated steam, would use one or the other of these well-known superheating contrivances—that is, either an independent superheating furnace or a non-independent one, as his judgment or taste might dictate. Both were equally well known, and there would be no invention in selecting either the one or the other. If he selected the independent superheater he would have in the Tweddle apparatus the combination of elements mentioned in the seventh claim of complainant's patent. It seems that Mr. Osgood is of the opinion that a mechanic, in working out the Tweddle invention, would be more likely to select a non-independent superheater, for the reason that they were more commonly used; but, even if this were true, it does not change the fact that both were equally well known and within the knowledge of competent mechanics, and could be employed by such mechanics without exercising invention. This is especially true for the reason that the
use of an independent superheating furnace in combi-
241 nation with a vacuum still and steam generator was also
known and described in the Gilbee patent, Defendant's Exhibit K. Mr. Osgood says that he does not understand the construction of the exhaust pump which is shown in the Gilbee patent, and I have previously said that I do not understand it, but I do not see that the description and drawing of this patent is less clear on that account, so far as it bears upon the subject-matter of the seventh claim. The drawing simply indicates the location of the exhaust pump in the apparatus, and if the representation of the pump was omitted altogether, as it is in complainant's patent, the information of the general operation of the apparatus would be sufficient to enable a mechanic to construct and use it. The specification of the Gilbee patent says that the vacuum pump may receive

its motion from any suitable prime mover, in connection with conical pulleys, and that the motion of the pump should be intermittent so as to produce not more than about half a vacuum, and that the furnace of the still is provided with a pyrometer and the still with a gauge for indicating and regulating the action of the air pump. I conclude from this description that any ordinary air pump operated intermittently, by watching the gauge, so as to maintain about half a vacuum in the still, will answer the requirements of the Gilbee patent. So for as the apparatus is concerned, it would, of course, not involve invention to operate the air pump continuously, so as to maintain a nearly perfect vacuum in the still, if the nature of the material which was being distilled should require such treatment.

I do not understand that the manner in which the superheated steam is employed in the still, whether by surface heating or injection, forms an element of the seventh claim. I think that either of these modes is fairly within the claim if an independent 242 superheating furnace is employed, but the Tweddle patent shows and describes both modes of using the superheated steam. The drawing shows a still provided with a coil of pipe for heating the oil and also perforated pipes for injecting the steam into the oil. The specification states that the coil may be used for heating the oil with steam up to the distilling temperature, and afterward the steam distributer may be used for carrying on the distillation, or that either of them alone may be used, as may be preferred. The specification also states that the invention consists in the use of superheated steam for distilling hydrocarbon oils and fats under a vacuum or partial vacuum, and afterwards describes the advantages flowing from the use of superheated steam. It follows from this that when the inventor says that either the coil or the steam distributer may be used alone that he means to use either of them with superheated steam, if preferred, and I see no reason why the apparatus could not be so used. In speaking of the Tweddle patent I refer to the reissue, Exhibit H.

I do not understand that the use of an independent superheating furnace produces a different result than the use of a non-independent furnace in the same combination. Steam heated to the same temperature in a non-independent furnace would certainly produce precisely the same result in the distillation, and I know of no reason why steam could not be heated as conveniently and economically in a non-independent furnace as in an independent furnace.

The same reasoning applies to Exhibit Q, which describes the employment of superheated steam in connection with a vacuum still for petroleum.

11 Q. Do you know any reason why petroleum cannot be distilled by injecting superheated steam into the body of the oil?

A. I do not.

243 12 Q. Is there any good reason for saying that the closed vessel D in Defendant's Exhibit Y is not a still?

A. I should call it a digester.

13 Q. Is the retort in the Howarth patent, Defendant's Exhibit X, in the nature of a still?

A. Yes, sir.

14 Q. Assuming that Mr. Osgood's interpretation of the eighth claim is correct, namely, that it is limited to a construction of the independent superheating furnace alongside the boiler in such a manner that the same fire used in the superheating furnace is conducted through a flue space (called by him a port) at the rear of the boiler, and thence passes into the furnace space of the boiler, and assists in generating steam in the boiler, what consequence, in your opinion, would follow from the adoption of such a construction?

A. Probably a saving of fuel in the generation of the steam.

15 Q. Would such consequences have any special relation to a vacuum petroleum still?

A. No; the effect would be precisely the same, whether the steam were used in distillation or for any other purpose.

16 Q. Would the presence or absence of a vacuum petroleum still or of any petroleum still have anything to do with this saving or economy in the sense of forming an element with the other elements named in a combination claim?

A. I would not; the port or communication between the superheating furnace and the boiler flue would operate in precisely the same way, whether the steam is used in a petroleum still or in a different apparatus, and the vacuum still will operate in precisely the same way, whether the steam is derived from a superheater having the communication spoken of or not.

244 The economy, if any results, is due solely to the fact that less fuel is required for generating the steam in the boiler by utilizing the waste heat from the superheater, and not at all to the fact that the steam is used in a petroleum still. I can see no combination in a patentable sense between a steam boiler and a superheater having this peculiar communication and a vacuum petroleum still. Each of these two groups of parts works out its own result without being at all modified by the presence of the other.

Defendant's counsel produces in evidence a certified copy of the specification of letters patent granted John A. Bassett July 8, 1862, No. 35807, for improvement in making oil and water gas, being the specification of the same patent, the drawing of which has been heretofore produced in evidence and marked Defendant's Exhibit W, C. B. H., Sp'l Ex'r, and the same is received in evidence and marked Defendant's Exhibit W, C. B. H., Sp'l Ex'r.

Defendant's counsel also offers in evidence a certified copy of the specification of letters patent granted William Elmer September 15, 1863, No. 39905, for improvement in manufacture of illuminating gas, being the specification of the same patent, the drawing of which has been heretofore produced in evidence and marked Defendant's Exhibit V, and the same is received in evidence and marked Defendant's Exhibit V, C. B. H., Spec. Ex'r.

Cross-examination reserved.

C. B. HILL,
Special Ex'r.

245 NOVEMBER 29, 1884.

Same appearances, and examination adjourned to December 8, 1884.

DECEMBER 8, 1884.

Adjourned to December 12, 1884.

DECEMBER 12, 1884—12 m.

Same appearances, and witness WILHELM cross-examined by GEO. B. SELDEN, Esq., complainant's counsel:

17 X Q. Referring to the Gengembre patent, Defendant's Exhibit G, is not that portion of the retort which contains the rotary coal crusher represented in the drawings and described in the specification as occupying a position at an angle with the horizontal line?

Ans. Yes, sir.

18 X Q. And the tower or upright portion of the retort to which the pipes which you call goose-necks are attached connects with the upper or highest end of that portion of the retort which contains the coal crusher, does it not?

Ans. Yes, sir.

19 X Q. What do you understand to have been the object of placing the lower portion of the retort in an inclined position; was it not to facilitate or assist the passage of the coal from the upper end of the retort to the lower?

Ans. I presume the lower part of the retort is slightly inclined to assist the vanes "*i*" in moving the contents of the retort gradually towards the front end, where the exhausted charge is discharged.

246 20 X Q. Do you understand that there was in the Gengembre patent a rotary crusher, "*m*," placed at the lower end of the upright portion of the retort where it connects with the inclined portion?

Ans. Yes, sir.

21 X Q. What arrangement was made in the Gengembre patent for disposing of the coke or residuum left after the distillation of the coal?

Ans. It passes out of the retort through a perpendicular spout, "*d*," and into a trough, "*e*," which is filled with water.

22 X Q. Some such arrangement as this would be indispensable to the continuous working of a device for distilling coal, would it not, as otherwise the operation of the apparatus would be stopped by the accumulation of exhausted coal or coke at the lower end of the inclined retort?

Ans. A sealed discharge or a trapped discharge, trapped either by water or by a valve, would be necessary to make the operation of the apparatus perfectly continuous, but I think that it could be made approximately continuous by an intermittent discharge—that is, a discharge which delivers a certain quantity of the exhausted material at suitable intervals of time.

23 X Q. If an inclined retort, such as the lower portion of the Gengembre retort, were partially filled with oil or other liquid the

surface of the liquid would be nearer the top of the retort at its lower end than it would be at its upper end, would it not?

Ans. Yes, sir.

247 24 X Q. So that if such a retort were filled with oil or other liquid and a series of goose-necks were connected to the top of the retort a draft or suction applied to the goose-necks would act with different degrees of force in withdrawing the vapor from the oil or liquid on account of the difference in the distances from the surface of the oil to the openings in the goose-necks?

Ans. I think not, unless the space above the oil opposite one or more of the goose-necks were so contracted that it could not supply the volume of vapor which is drawn off or required to be drawn off by such goose-neck or goose-necks.

25 X Q. Have you not said in you redirect examination at folio 20, page 146, that "the draft through the different goose-necks will always be proportionately stronger in the goose-necks which are nearer the point of suction?"

Ans. Yes, sir.

26 X Q. If an inclined retort like Gengembre, provided with the discharge pipe "*d*" and water trough "*e*," were filled with oil or other liquid what would prevent its running out of the retort through the pipe "*d*" and trough?

Ans. No means are provided in Gengembre for preventing liquid from running out of the retort through the spout "*d*."

27 X Q. Do you find in the Gengembre patent any suggestion whatever that the patentee contemplated the distillation of oil or other liquid in his apparatus?

Ans. No, sir.

248 28 X Q. The construction of the feeding boxes "*l*" "*l'*" for introducing the fresh charge of coal, the vertical position of a portion of the retort so that the coal could feed to the crusher by gravity, the crusher and conveyor or vanes "*i*" "*i*," and the discharge apparatus, consisting of the spout "*d*" and water trough "*e*," for disposing of the spent coal or coke all indicate, do they not, that the Gengembre apparatus was designed exclusively for the treatment of solid or semi-solid substances as distinguished from liquids?

Ans. Yes, sir.

29 X Q. What do you understand to have been Gengembre's object in "keeping up a strong circulation of permanent gas through the retort or generator" as described in the second paragraph of the specification of his patent?

Ans. Facilitating the generation of oleaginous vapor and increasing the yield of oil.

30 X Q. Do you find in the specification of the Gengembre patent anything which indicates that the inventor contemplated that there would be a vacuum in this apparatus when the same was in operation?

Ans. No, sir.

31 X Q. Do you not understand from the paragraph, folio 322, page 77, D. R., "I have described the exhauster used by me as a force pump, but any other well-known device may be employed to produce

a similar result," that the inventor contemplated the use of a rotary fan as an equivalent for his pump so as to "cause the current of gas to flow rapidly through the apparatus," as described in folio 321?

249 Ans. I understand from the paragraph quoted that the inventor intended to embrace by his patent another air circulating device which would maintain the current of gas through the several parts of the apparatus; if a rotary fan would produce the same result it would be an equivalent of the pump which is described in the patent; I do not think a rotary fan would be an effectual device for the purpose, but a rotary pump would be.

32 X Q. What degree of vacuum do you suppose could be maintained in practical operation in an apparatus like that described in the Gengembre patent, in which a circulation of gases is kept up by a pump and in which the condensing or receiving vessels are provided with the siphons or traps "S" and "S′," as shown in the drawings of the Gengembre patent?

Ans. A vacuum proportionate to the capacity of these traps to exclude the external air from the apparatus.

33 X Q. What do you suppose would be the capacity of the traps to resist the entrance of a current of air into the apparatus in case there was a vacuum or a partial vacuum therein?

Ans. It would be controlled by the preponderance of the weight of the column of liquid in the highest part of the trap over the column in the lowest part. In other words, if there is a vacuum within the apparatus and the liquid column in one leg of the siphon or trap is twelve inches higher than in the other the capacity to resist the influx of the air would be proportionate to the weight of these twelve inches of liquid.

250 34 X Q. Can you state whether the liquids, viz, "tar and other heavy products of distillation," in the traps "S" and "S′" in the Gengembre patents would be lighter or heavier than water?

Ans. I presume they are lighter, but I cannot say so from actual observation.

35 X Q. If these siphons or traps were filled with water how long would they have to be in order to maintain a complete vacuum in the apparatus?

Ans. Thirty-two feet or more.

36 X Q. If in the Gengenbre apparatus the permanent gas is forced by the pump through "the pipe '*d*' into the retort, thus forming a strong and continuous current passing through the retort," as described in the specification of said patent, D. R., page 76, folio 318, how could there be a vacuum in said apparatus while in practical operation?

Ans. A partial vacuum would be produced by the condensation of the condensible vapors and the discharge of the condensed liquid from the apparatus, and this partial vacuum or rarification of the gas within the apparatus would be proportionate to the relative volumes of the condensible gas and permanent gas and to the capacity of the discharge and feed devices for excluding the external air.

37 X Q. These traps "S" and "S′" in the Gengembre apparatus would resist the escape of air, gases, or liquid from the apparatus and serve to maintain a pressure in the apparatus greater than that of the external atmosphere, would they not?

Ans. They prevent the escape of gases from the apparatus and the influx of air into the apparatus, and for that reason they may 251 serve to maintain a higher or a smaller density of the gases in the apparatus as compared with the external air.

38 X Q. Do you not understand from the description and drawing of the safety valve "*h′*" in the Gengembre apparatus that the inventor intended that the gases should be delivered from the pump into the return pipe "*d′*" at a pressure greater than the atmospheric pressure?

Ans. I do not understand that an over pressure of gas in the apparatus is designed to be used. I understand the safety valve to be provided for the purpose of discharging an excessive quantity of the permanent gas if that should exist; and as the flow of gas into the retort is controlled by the throttle valve "*f* 1" in the return pipe "*d* 1," and the safety valve "*h* 1" is connected with the return pipe between the pump and the throttle valve, there may be an over pressure in this return pipe when the throttle valve is partially closed, while a partial exhaustion exists in the retort; the safety valve will relieve such over pressure if it should occur, and permits the superfluous volume of permanent gas to escape, and in that way regulates the pressure of the gas in the retort.

39 X Q. If there were a vacuum in the retort of the Gengembre apparatus what would prevent the water in the trough "*c*" being drawn up through the spout "*d*" into the hot coal?

Ans. Nothing, except the length of the spout.

40 X Q. Referring to the Hamilton patent, Defendant's Exhibit S, do you understand that the resin or resinous substances which the apparatus is designed to treat would be in a liquid or fused condition when undergoing distillation in the still "A?"

252 Ans. I understand that they are in a liquid condition.

41 X Q. And during the distilling operation, when the still is full, it would be necessary to keep the cocks in the junction pipes "K," "K′," "K^2" closed so as to prevent the fused liquid from flowing out of the still?

Ans. Yes.

42 X Q. Then, during the first part of the distilling operation, in which there would be the freest evolution of gas and vapors, there would be but a single pipe through which the distillation from the still would take place?

Ans. During the first part of the distillation the gas escapes only through the upper pipe "K."

43 X Q. What is the object of connecting these pipes, "K," "K," "K′," "K 2 d," with the side of the still, one above the other, and providing the three lower pipes with cocks, as described in the specification of the said Hamilton patent?

Ans. To allow the products of distillation to pass off as near the surface of the liquid contents of the still as practicable.

44 X Q. And the inventor states, does he not, that the products

of distillation of the resin and resinous substances designed to be treated in the still will not "rise sufficiently high to pass out of the ordinary still outlet orifice?"

Ans. Yes, when the low temperature is used.

253 45 X Q. The Hamilton still seems to have been designed with special reference to certain peculiar difficulties which the inventor had encountered in the distillation of resin and resinous substances so as to obtain valuable products therefrom?

Ans. I do not know; at least I do not recall any such statement of the inventor.

47 X Q. Is there any suggestion in the Hamilton patent that the Hamilton still can be adapted to the distillation of any other than the resin and resinous substances mentioned therein?

Ans. I think not.

Redirect examination by JAMES A. ALLEN, Esq., defendant's counsel:

48 R. D. Q. In the drawing of the Gengembre patent is the lower leg of the retort shown as inclined or is it merely the crusher that is shown to be inclined?

Ans. The lower part of the retort is slightly inclined, but the angle of the inclination is so slight that the specification calls it "the horizontal retort '*a*.'"

49 R. D. Q. Referring to the 25th cross-question, has the quotation from your evidence embodied in the question any relevancy to the answer given by you to the 24th cross-question?

254 Ans. None whatever; because the relative arrangement of the goose-necks with reference to the point of suction is not alluded to in the 24th cross-question.

50 R. D. Q. What difference is there in the nature of the products produced by the destructive distillation of oleiferous minerals, such as cannel coal and the like, and of the products produced by the destructive distillation of petroleum?

Ans. They are similar products, similar oils, and similar gases.

51 R. D. Q. In your opinion, would the changes in the Gengembre apparatus which would be required to adapt it to the destructive distillation of a liquid oil-producing material, such as petroleum, instead of shale, slates, or cannel coal, be such as involve invention, or, in your opinion, could they have been readily made with the mere knowledge and skill of an ordinary mechanic?

Ans. They could have readily been made by a competent mechanic without the exercise of invention.

52 R. D. Q. In the operation of the Gengembre apparatus, if the cock "*f*" were closed would not the action of the pump on all the parts between the pump and the retort be simply that of an exhaust?

Ans. It would.

53 R. D. Q. You understand, do you not, that at the end of the different spouts emptying out of the apparatus, such as the spout "*d*" and the pipes "S" and "S′," special provision is made

for a water joint with a view of excluding the air from 255 passing up into the retort, and that a provision for a like purpose is made by the tightly-fitting lid of the charging boxes "I" "I′", and that the entrance of atmospheric air by the terms of the specification at all such points in the apparatus is sought to be carefully excluded, and that the intention by such exclusion is to give to the air pump its proper action upon the contents of the different vessels.

Ans. Yes, sir.

54 R. D. Q. Do you understand that the first part of the distilling operation in respect to substances like resin, petroleum, and other hydrocarbons is the one in which there is the freest evolution of gas and vapors?

Ans. I do not.

55 R. D. Q. Would you consider the distillation of resin by the process described in the Hamilton patent, Exhibit "S," to be analogous to the distillation of petroleum?

Ans. Yes, sir.

56 R. D. Q. And would you think that a described apparatus for the distillation of the one substance would be likely, in point of fact, to suggest a similar construction for the distillation of the other?

Ans. Certainly.

EDWARD WILHELM.

256 United States of America, } ss:
Northern District of New York, }

I, Charles B. Hill, appointed a special examiner of this court by an order therein made and entered with the clerk thereof on or about the 21st day of April, 1883, in this action, wherein The Vacuum Oil Company is complainant and The Buffalo Lubricating Oil Company, Limited, is defendant, do certify that I was attended at the office of James A. Allen, Esq., in the city of Buffalo, in said district, on the 15th day of October, 1884, and on such other subsequent days as are mentioned in the annexed deposition, by James A. Allen, Esq., of counsel for the defendant, and by George B. Selden, Esq., and Thomas G. Outerbridge, Esq., as counsel for the complainant, and by the witness, Edward Wilhelm, whose deposition is hereto annexed; that the said witness, having theretofore been by me duly sworn and cautioned to tell the truth, the whole truth, and nothing but the truth in said cause, was, on said 15th of October, recalled by the defendant's counsel and was thereupon further carefully examined; that said witness did thereupon depose as appears in his foregoing deposition, which was reduced to writing in the presence of said witness and was read over to said witness and signed by him as and for his deposition in my presence, but, by consent of counsel, not in their presence.

I further certify that I am not of counsel or attorney to either of the parties to said cause nor in any way interested in the event thereof. I further certify that in the taking of said evidence I have complied in all respects with requirements of the 67th rule, in equity, as amended, of the Supreme Court of the United States, and I herewith transmit such evidence, with all the exhibits therein referred to, to the clerk of the court in which said cause is pending.

Witness my hand this 26th day of December, 1884.

CHARLES B. HILL,
Special Examiner.

257 *Defendant's Exhibits.*

EXHIBIT A.

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE.

To all persons to whom these presents shall come, Greeting:

This is to certify that the annexed is a true copy from the files of this office of the specification and drawing in the matter of the letters patent granted Jacob Reese May 19, 1863, number 38602, for improvement in oil still.

In testimony whereof I, E. M. Marble, Commissioner of Patents, have caused the seal of the Patent Office to be affixed this 30th day of June, in the year of our Lord one thousand eight hundred and eighty-three, and of the Independence of the United States the one hundred and seventh.

[L. S.] E. M. MARBLE,
Commissioner.

(Here follows diagram marked p. 258.)

259 *Specification Forming Part of Letters Patent No.* 38602, *Dated May* 19, 1863.

To all whom it may concern:

Be it known that I, Jacob Reese, of the city of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful improvement in furnaces and stills for distilling petroleum and other hydrocarbon oils, and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the annexed drawing, forming part of this specification, in which—

Figure 1 is a front elevation of my improved furnace and still.

Figure 2 is a vertical section through the line *x x* of figure 3—that is, through the axis of the stills, showing the interior of the still and the diaphragms or partitions therein.

Figure 3 is a plan or top view of my improved furnace and stills, a portion of the still at one end being removed so as to exhibit the interior of the furnace beneath it.

Figure 4 is a sectional elevation of the furnace and still, through *v w*, figure 3, seen from the rear of the furnace, being at one end of the figure a section through the hinder part of the fire chamber of the furnace; in the middle a section through the smoke flues and smoke stacks, and at the other end a section through the cold-air flues and stacks.

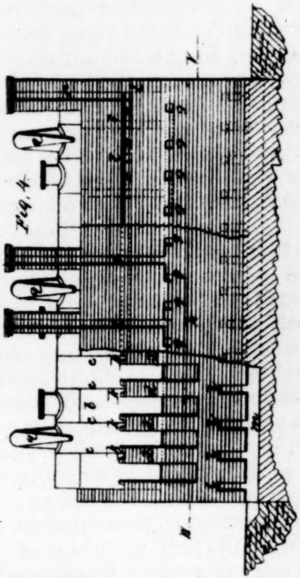
Figure 5 is a transverse section of the furnace and still through one of the fire chambers and smoke flues—that is, through Y Y.

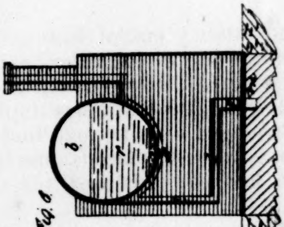
No. 271
Y. O. Co.
v.
B. L. O. Co. } p. 258

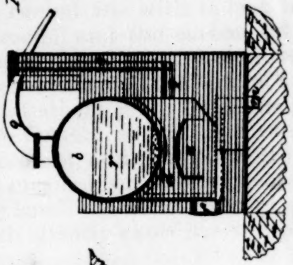
J. Reese.

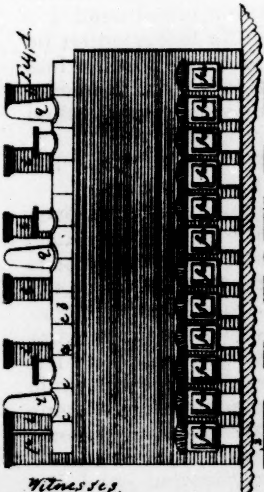
Oil Still.

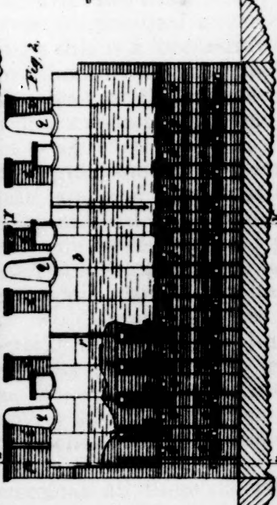
No. 38,602. Patented May 19, 1863.

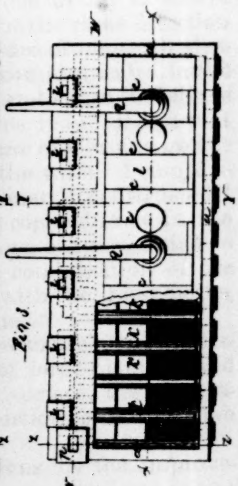












Witnesses,
W Bakewell
J D Hancock

Inventor
Jacob Reese

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Figure 6 is a transverse section of the furnace and still at the line *z z*, figures 2 and 3—that is, through the end wall of the furnace and the cold-air stack.

In each of the several figures like letters of reference denote similar parts.

My invention is designed as an improvement on the mode of constructing and setting oil stills in their furnaces, for which
260 letters patent of the United States, No. 35838, were granted to
me on the 8th day of July, 1862.

In the specifications accompanying said letters patent just referred to I have set forth the great advantages in the process of distillation of carbon oils, as well as in the safety of the operation of employing stills of large capacity, which are, briefly, that by the use of large stills the oil is less likely to boil over; that a higher degree of heat can be employed with safety and thereby the process may be more rapidly carried on, and that the resulting product of distillation is more uniform in quality.

The practical difficulty which had prevented the use of stills of sufficiently large capacity was that the joints and rivets being exposed to the direct action of the fire caused the stills to leak by the expansion and contraction of the metal, and the carbon oil is so highly inflammable that serious danger of fire and explosion resulted therefrom. To overcome this obstacle I invented the plan of so constructing stills and their furnaces that all the joints or seams in the still inside of the fire chamber of the furnace should be covered by walls or supports of brick-work or cement, and thus protected from the direct action of the fire. By this means I am enabled to use stills of large capacity and comparatively small diameter, thereby giving a large fire surface to the still, which greatly expedites the process of distillation aud economizes the heat.

I have found, however, by practical experience in my extensive oil refinery, that although this is a long stride in the right direction and a very great improvement in the manufacture of refined hydrocarbon oil, yet that the heat of the furnace communicated to the boiler would more or less expand the rivets and cause the sills to
leak at the rivet holes when the heat was reduced, and that
261 the oil is of so very great tenuity that some of it would escape
between the walls and the surface of the stills. I also discovered that in a long cylindrical still as ordinarily constructed I could not use more than one goose-neck (as I proposed to do in the specification before referred to) to any advantage, because, owing to the slight vacuum in the still, caused by the condensation of the vapor in the condenser which communicates with the goose-necks, only one of the goose-necks would run at a time.

In a still of large capacity the use of one goose-neck only necessitates the employment of a condensing pipe of large diameter and therefore of comparatively small condensing surface, the circumference of a small circle being greater in proportion to its area than that of a larger one.

I have, however, overcome all these objections by the improvements in the furnace and still hereinafter described, which I have fully tested by actual use on a large scale.

To enable others skilled in the art to construct and use my improvements, I will proceed to describe them more fully.

In the drawing *a* represents the furnace on which the still *b* is set.

The still is constructed of a number of curved plates of boiler iron lapped at the edges and riveted together, the joints parallel to the axis of the cylinder being all situate in the upper portion of the still above the level of the fire chamber of the furnace; the circumferential joints *c c c* are at uniform distances apart, and under each such joint is placed a supporting partition fire wall, *d d*. These supporting fire walls are arched (as seen in figure 5), so that the partitions do not serve to separate the several fire chambers, *e e* and *c*, but each opens into those adjoining it, and thus the temperature of the whole furnace is equalized.

262 The upper surface of each of the partition fire walls *d d* is an inverted arch, so that the bottom of the cylindrical still rests on them.

There is a separate fire door, F, to each fire chamber, *e*. Thus far the construction of the furnace and still resembles that described in my patent of July 8, 1862. Each fire chamber has a separate flue, *g*, for the escape of the smoke and products of combustion of the fuel, two such flues of adjoining fire chambers uniting in the back wall *h* of the furnace and connecting with a chimney or smoke-stack, *i*. See figures 4 and 5.

On the top of each of the partition fire walls *d d* (the shape of which is an inverted arch, as before stated) is a channel or gutter, *k*, which, when the still rests on the top of these walls, forms part of the cold-air flue *l*.

The top of each of these partition walls *d*, on each side of the gutter *k*, is in close contact with the surface of the still, the circumferential joints *c c*, of which occur in each case immediately over a gutter in one of the supporting partition walls *d d*, as seen in figure 2, so that if any oil should leak out of still at the rivet holes or between the lapped edges of the plates composing the still it will run into the gutter *k*, and cannot reach the fire. A cold-air passage, *m*, extends horizontally along the furnace near the front and below the fire chambers (see figures 4 and 6); with this air passage, *m*, a series of air flues, *l*, communicate, which air flues, *l*, pass up through each of the partition fire walls *d* and open into the gutter *k* at the front side of the furnace at the point where the wall of the furnace touches the outside of the still *b*.

At the other or rear end of each gutter, *k*, the flue *l* opens into an upper horizontal air passage, *n* (see figure 4), which extends through the back wall of the furnace, above the fire-chambers, and 263 which terminates at one end of the furnace in an air stack or chimney, *p*. These air flues *l* have no connection whatever with the smoke flues *g* or smoke stack *i i*. By this means a current of cold air is passing at all times when the furnace is heated along the lower air passage *m* up through each of the flues *l*, around each of the gutters *k*, and thence along the upper air passage *n*, and out at the air chimney *p*, the effect of which is to keep the still comparatively cool around the rivets and at the seams or lapped edges of the still, and thus in a great measure prevent their leaking, and should any oil have escaped into the gutters *k k* the current of air traversing the gutters will vaporize and carry it off.

In stills of large capacity it is necessary, in order to carry on the process of distillation with rapidity, to furnish more than one exit for the vapor of distillation, because, as before stated, a single exit pipe of sufficiently large diameter to carry off the vapor generated in such a still would present a comparatively small exterior surface to the refrigerating effects of the cold water in the condenser. Owing to the greatly diminished volume of the condensed oil as compared with that of the vapor, a slight vacuum is created in the still, or, more correctly speaking, the pressure inside the still is somewhat less than the pressure of the atmosphere, which when two exit pipes are used opening into the same vapor space in the still causes a slight reaction in one goose-neck, while the other is flowing.

In order to overcome this difficulty and to enable two or more goose-necks to be used in large stills, I make use of a partition or partitions, *r*, as many as may be required by the size of the still, which separate the vapor space of the still into as many distinct compartments as I desire to use goose-necks, but which, not reaching quite to the bottom of the still, allow a free communication
264 from one partition to the other of the oil, thus preserving
uniformity of temperature of the distillate (or crude oil in the still) and preserving the oil in all the compartments at the same height in the still.

In the drawing *q q* are the goose-necks, ranged at almost uniform distances apart on the top of the still. Between each goose-neck, *q*, I place in the still a partition, *r* (see figure 2), which extends down nearly to the bottom of the still, so as to separate the vapor space above the surface of the oil between the partitions completely, the bottom of each partition extending down to a point which will always be a little below the surface of the distillate even when the oil is nearly all run over.

This narrow opening at the bottom of each partition is sufficient to allow of the free passage of oils from between the partitions, which keeps it at a uniform height and temperature.

Instead of partitions extending nearly to the bottom of the still partitions may be used which unite with the still at all points of their circumference, and all perforated with holes below the lowest point of the surface of the oil.

Having thus described my improvement in stills and furnaces for distilling hydrocarbon oils, what I claim as my invention, and desire to secure by letters patent, is—

The use of partition fire walls in still furnaces, each having a gutter or air flue in its upper surface, so situate in relation to the still that the seams or joints of the still shall be situate over the gutter or flue while the wall on either side of the gutter is in close contact with the surface of the still, in a manner and for the purposes hereinbefore described.

265 Also the use in combination with the guttered fire walls enclosing the joints of the still of air flues for the purpose of passing a current of cool air along and over so much of the joints and rivets of stills as are situate in that part of the still which is situate within the fire chamber of the furnace, and thereby prevent the opening of the joints and carrying off any oil which may leak from the still.

Also the use of two or more goose-necks in a single still where the still is so constructed as that a separate vapor space is formed for each goose-neck, while the fluid distillate is allowed to pass freely between the compartments thus formed.

Also the use in stills of partitions extending below the lowest level of the fluid to be distilled so as to separate the vapor in each compartment from that in the adjoining compartments, and afford a free passage between the compartments of the fluids to be distilled, for the purpose of allowing of the use of two or more goose-necks or vapor pipes in one still, substantially as described.

In testimony whereof the said Jacob Reese has hereunto set his hand is presence of us.

JACOB REESE.

Witnesses:
W. BAKEWELL.
J. D. HANCOCK.

M. McK., J. A. W.

(Here follows diagram marked page 266.)

267 DEFENDANT'S EXHIBIT B. C. B. H., Sp'l Ex'r.

UNITED STATES PATENT OFFICE.

ABRAM D. HIGHAM, of Jersey City, New Jersey.

Improvement in Distilling Petroleum.

Specification forming part of Letters Patent No. 54157, dated April 24, 1866.

To all whom it may concern:

Be it known that I, Abram D. Higham, of Jersey City, in the county of Hudson and State of New Jersey, have invented a new and useful improvement in distilling petroleum and other hydrocarbons; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawing, forming a part of this specification, in which—

The drawing shows a side view, and also an end view, of an apparatus made and arranged for the purpose of illustrating my invention.

DEFENDANT'S EXHIBIT B.

A. D. HIGHAM.

Oil Still.

No. 54,157. Patented April 24, 1866

Fig. 2.

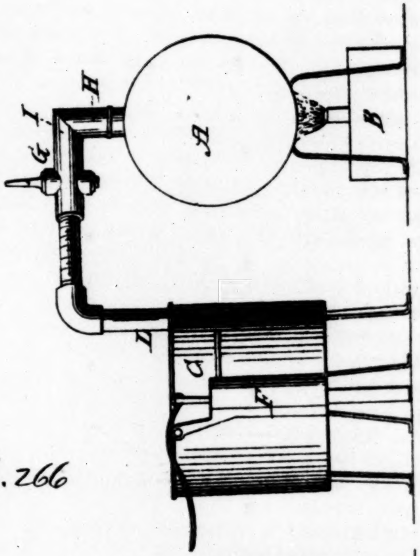

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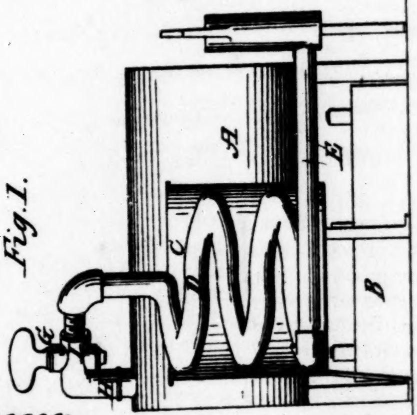
Fig. 1.



Witnesses:
J. W. Blaughton
Wm. Trevin

Inventor:
A. D. Higham
Per Munn & Co
Attorneys

This invention consists in a new method of distilling hydrocarbons, whereby a larger percentage of illuminating-oil is obtained from a charge than is obtained by the method hitherto known or used, the quantity of residuum being diminished, and the light oils which are commonly run off separately from the illuminating-oils being, by my method, made into good illuminating-oil.

The letter A designates a still, beneath which is placed a heating apparatus of any suitable character, which should be regulated to maintain a uniform, steady heat, so as not to burn the oil or its vapors. The still is to have the usual man-hole (not here shown), through which access may be had to the interior of the still. Its goose-neck H is connected to a pipe that communicates with a worm, D, which is carried through a condensing-tank, C, to a pipe, E, which connects said worm to a pump, F, placed at any convenient distance from the condenser. A stop-cock, G, is placed in the pipe I, which connects the goose-neck with the worm.

The spout of the pump is connected with the usual trap and gas-pipe (not shown) commonly used in distilling hydrocarbons, and which are familiar to distillers.

In distilling hydrocarbons by my method, I charge the still in the usual manner and supply the condensing-tank with a condensing medium in any suitable way. When the fires are started the pump is operated so as to draw away the vapors generated in the still without allowing them to be subjected to the pressure of the atmosphere. I continue to draw off the vapors in this manner *in vacuo* so long as the distillate runs of a sufficiently-light color and of the proper gravity. When its gravity becomes too great or its color too dark I remove the pump and run off the rest of the charge under pressure from the atmosphere, using either the natural pressure or a greater pressure, according to the character of the crude oil, the usual trap and gas-escape pipe being then applied to the discharge-pipe E. If the distillate now becomes too dark in color or too heavy the pressure on the charge is increased by means of the cock G, which intersects the pipe I, leading from the goose-neck to the worm, said cock being turned more or less so as to obstruct the discharge of vapors and thereby increase the pressure under which the vapors are formed. When the charge has been run off the residuum, if any, is removed from the still in the usual way.

The light oils, in distillations conducted in the way now generally followed, are run off in the early stages of the process and are kept separate from the illuminating-oils, which come off afterward, because such light oils will not stand the requisite fire-test; and if such light oils are mixed with illuminating-oils after distillation the latter lose their safe character and will not stand the required test; but by means of my invention those volatile portions of the charge which in ordinary distillations produce benzine or other light and explosive oils are caused to become good illuminating-oil, which will stand the required test, so that the first part of the distillate does not require to be kept separate from the latter distillates.

This method of conducting the distillation of hydrocarbons enables me to effect the distillation at a lower temperature than is commonly employed, and consequently the tarry and residuous matters are much less in quantity because the oil and vapors are less liable to become charred and burned. I also greatly increase the relative amount of good illuminating-oil obtained from the charge, the increase being from five to fifteen per cent., according to the character of the crude oil. This increase results from the amount of benzine (when distilling petroleum) which is saved by mixing all, or nearly all, of it with the illuminating-oil, their vapors being brought over together, and from the fact that the 268 amount of residuum is greatly diminished by running off the charge or most of the charge at a low temperature.

It will be observed that I do not maintain a vacuum in the still during the whole time of distilling a charge, nor do I claim such a method of conducting distillations.

What I claim as new, and desire to secure by letters patent, is—

The method, substantially as above described, for conducting distillations of hydrocarbons—that is to say, distilling the lighter portions of the charge *in vacuo* and the heavier portions under pressure, as and for the purpose set forth.

ABRAM D. HIGHAM.

Witnesses:
M. M. LIVINGSTON.
ALEX. F. ROBERTS.

(Here follow diagrams marked pp. 269 & 270.)

271

UNITED STATES PATENT OFFICE.

AUGUSTUS H. TAIT and JOSEPH W. AVIS, of New York, N. Y.

Improvement in Distilling Apparatus.

Specification forming part of Letters Patent No. 53359, dated March 20, 1866.

To all whom it may concern:

Be it known that we, Augustus H. Tait and Joseph W. Avis, of the city, county, and State of New York, have invented a new and improved distilling apparatus; and we do hereby declare that the following is a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 represents a plan or top view of this invention. Fig. 2 is a transverse vertical section of the same, the line *x x*, Fig. 1, indicating the plane of section. Fig. 3 is a longitudinal vertical section of the same, the plane of section being indicated by the line *y y*, Fig. 1.

Similar letters of reference indicate like parts.

This invention refers to a distilling apparatus which is particularly intended for the purpose of refining petroleum and for separating the various ingredients thereof according to their specific gravity, or to their different boiling-points.

DEFENDANTS EXHIBIT C

2 Sheets—Sheet 1.

TAIT & AVIS.

Oil Still.

No. 53,359. Patented March 20, 1866.

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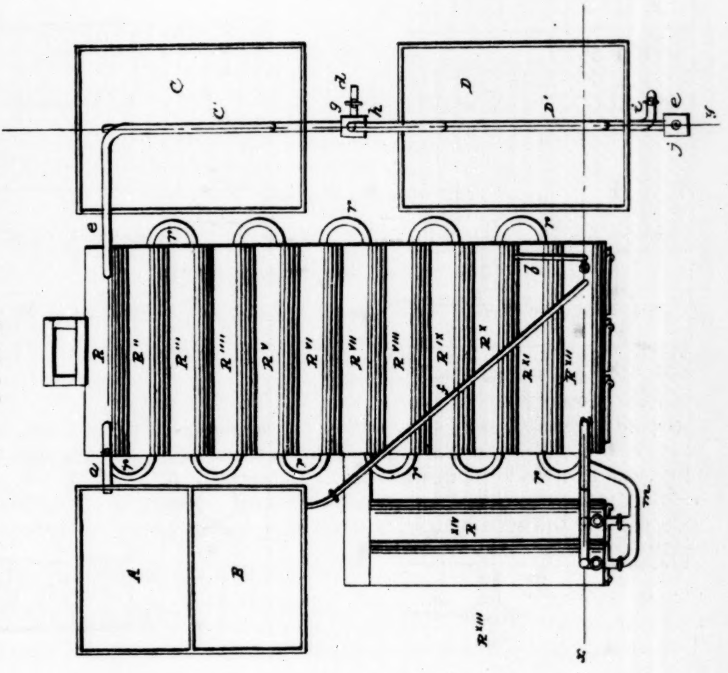
v
B. L. O. Co } p. 269

FIG. 1



WITNESSES:
M. M. Livingston
Wm. Treuren

NVENTOR.
A. H. Tait
Joseph W. Avis

The invention consists in the use of a series of cast or wrought iron retorts set horizontally alongside of each other and across the flue, and communicating with each other by zigzag tubes, in combination with a fire-grate the breadth of which is nearly equal to the length of the retorts, said fire-grate being at one end of the series and the chimney at the other end, in such a manner that the oil let into that retort next to the chimney on passing through the several retorts is gradually heated and evaporated. The vapors rising from the oil in the several retorts are swept off by the mechanical force of a current of steam or compressed gas injected through a suitable pipe in that retort immediately over the furnace, the discharge-pipe emanating from the first retort or from that next the chimney. It is obvious that the vapors rising in the different retorts are formed of liquid of more or less specific gravity, according to the greater or smaller heat existing in said retorts, and the heavy vapors of the hottest retorts on passing through the remaining retorts mingle with the lighter vapors contained in said retorts, and on being condensed yield a liquid fit for illuminating purposes. The heavy and light oils are separated during their passage through coils or serpentine pipes situated in condensers and tapped at different heights or at different distances from their commencement, and the lightest oil is pumped back into a suitable tank and passed again and again through the series of retorts. The tar and pitch pass off into a second set of retorts placed over a separate furnace and somewhat lower than the first series. One of the second set of retorts is always in operation while the other may be cleaned, and the products of evaporation of the contents of these retorts are carried back to the last retort in the first series and caused to mingle with the contents thereof, so as to be redistilled over and over until the same are completely divested of all parts capable of mixing with or forming burning oils.

A represents a tank which contains the crude oil, and which communicates by a pipe, *a*, with the first one of a series of retorts, R^{i} R^{ii} R^{iii} R^{xii}. These retorts are made of cast-iron or any other suitable material in a cylindrical or any other desirable form or shape, and they are placed horizontally alongside of each other over a flue which is provided with a fire-grate, situated under the retort R^{xii}, and which extends from said grate to the chimney that rises in close proximity to the retort R^{i}.

The several retorts connect with each other by means of pipes *r*, which extend from the opposite ends of the same, so as to cause the liquid or fluid introduced into the retort at one end of the series to pass through the several retorts in a zigzag course. The crude oil flows in a continuous stream into the retort R^{i}, and thence through the first pipe *r* to the second retort, and so on until all the retorts are filled up about half or to the middle of the connecting-pipes *r*. At this stage heat is applied by lighting a fire on the grate under the retort R^{xii}. The oil in the retorts is thus gradually heated, that in the retort R^{xii} being hottest and that in the retort R^{i} remaining coolest, and consequently the lightest components of the oil will be evaporated in the first and the heaviest components in the last retort. The vapors thus formed pass off through the connecting-pipes *r* from the retort R^{xii} to the retort R^{xi}, &c., to the retort R^{i}, and thence through the pipe *c* to the first condenser, C; and in order to drive off the vapors by mechanical force a stream of steam or heated compressed gas is passed in the last retort, R^{xii}, through the pipe 272 *b*, which connects with a suitable generator, being provided with a stop-cock, so as that the supply of steam or heated gas can be regulated at pleasure. While passing through the retorts the heavy vapors of the retorts R^{xii} R^{xi}, &c., mix intimately with the light vapors of the first retorts R^{i} R^{ii}, &c., and the product of condensation derived from the mixture of vapors is of the requisite density for burning oil.

The condenser C consists of a plain tank of sheet metal or any other suitable material, in which is situated a serpentine pipe, C'. The several bends of this pipe are placed one above another, so that the same are situated in different levels, and consequently the products of condensation derived from the several bends will be of different specific gravity, since the water in the condenser is coolest at the bottom and hottest on top. By tapping said serpentine pipe at different levels, therefore, liquids of different specific gravity will be obtained.

We do not wish to confine ourselves, however, to the precise form of serpentine pipe shown in the drawings, since an ordinary coil placed in a vertical or in a horizontal position will produce the same or a similar result; but we use said serpentine pipe by preference, as the products of distillation drawn from it at different levels can be readily distinguished according to their specific gravity.

The heavier oil, which has a high boiling-point, is condensed in the upper bends, where the water is hottest, and can be drawn off through the trap and cock *g*, while the light oils are drawn off at the tail-pipe *d*. The specific gravity of the oil drawn from said tail-pipe can be regulated by drawing off more or less of the heavy oil through the trap and cock *g*, and, if desired, by an additional supply of cold water to the condenser the quantity of light oils condensing in the serpentine pipe can be increased. If a heavier oil is required at the tail-pipe *d* the cock *g* must be checked or closed and the heavy oil allowed to pass on to the tail-pipe *d*, and the supply of cold water must be checked, so as to allow a greater portion of the light oil of the distillate to pass over into the second condenser, D, which connects with the first condenser, C, by the pipe *h*. These light oils and heavy naphtha are again separated during their passage through the second condenser, which is furnished with a serpentine pipe, D', trap and cock *e*, and tail-pipe *i*. By regulating the supply of cold water the light oil and naphtha of a density under 68° are drawn off at the trap and cock *e*, and collected in a separate receiver, whence it is pumped up into the tank B for future use, while the gasoline or light naphtha is received at the tail-pipe *i* and collected in a separate receiver, and the uncondensible gases pass off by the gas-pipe *j*.

The lower part of the first condenser, C, below the trap *g*, may be considered as a refrigerator to thoroughly cool the distillate.

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DEFENDANT'S EXHIBIT D.

~~C. L. H. SPL. EXr.~~

KELLEY & TAIT.

Oil Still.

No. 32,568.

Patented June 18, 1861.

Fig. 1

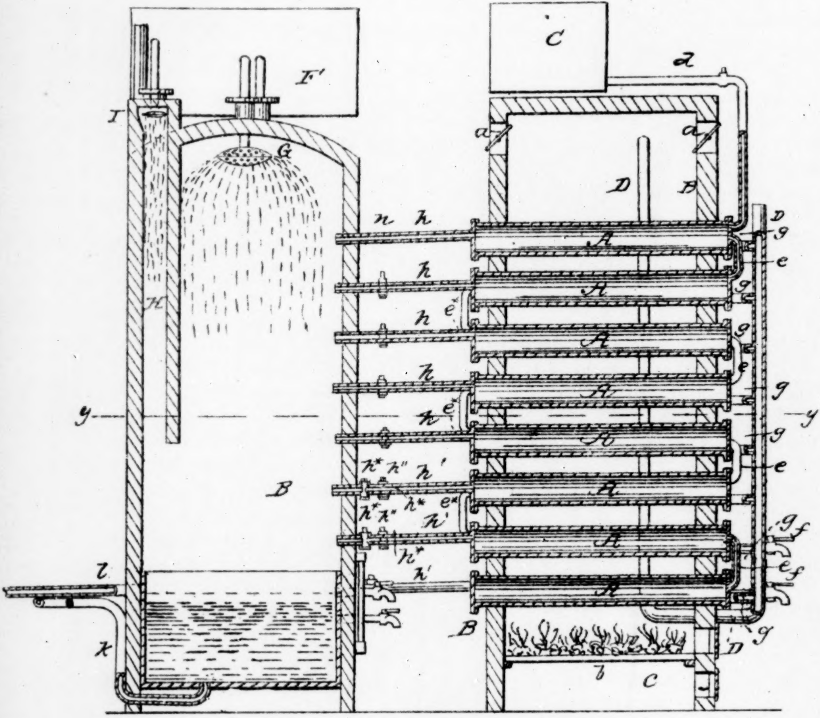
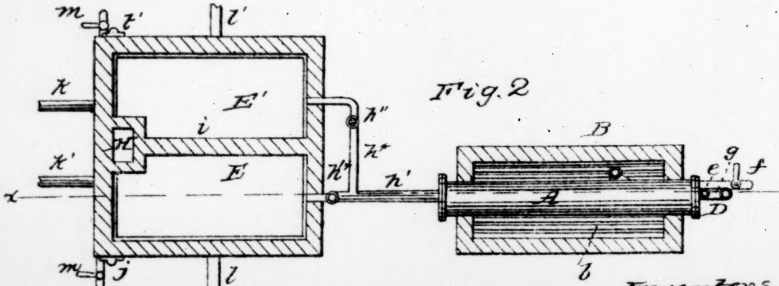


Fig. 2



Witnesses
Lewis A. Tucker

Inventors
E. G. Kelley
A. H. Tait

The light oils and naphtha collected in the tank B, as previously stated, may be run back to the retort R^{xii} through the pipe *f*, and the vapors rising therefrom, by being mixed with the heavy vapors contained in the last retorts, produce a distillate of the desired specific gravity.

The heavy products, such as tar and pitch, remaining in the retort R^{xii} are passed into one of the retorts R^{xiii} or R^{xiv}, which are placed separate from but contiguous to the first series, set lengthwise over a separate fire-place divided by a partition wall, so that they can be used alternately. They are set a little lower than the first series, so as to allow a fall for the tar and pitch to pass through the connecting-pipe *m*, which is provided with suitable branch pipes and cocks, so that either of the retorts R^{xiii} or R^{xiv} can be brought in communication with the retort R^{xii}. The object of having two or more additional retorts is to enable the operator to clean out the coke from one retort while the other is working without stopping the process. By means of this apparatus all the available constituents of crude petroleum are saved, and the percentage of burning-oil obtained is considerably larger than that obtained by ordinary distilling apparatuses. Furthermore, by our apparatus the distilling process can be carried on without interruption, and its operation requires a comparatively small expenditure of fuel.

It is obvious that this apparatus may be used for distilling other liquids besides petroleum, such as coal-oil or spirituous liquors.

We claim as new and desire to secure by letters patent—

1. The arrangement of a series of retorts R^{i} R^{xii}, set horizontally alongside of each other over and across the fire-flue, with the breadth of the fire-grate nearly equal to the length of the retorts, the furnace being placed at one and the chimney at the other end of the series, substantially as and for the purposes set forth.

2. The use of an impelled current of steam or suitable gas, in combination with the series of retorts R^{i} R^{xii}, substantially as specified, whereby the vapors are expelled from said retorts, and at the same time the heavy vapors of the last retorts are caused to mingle intimately with the light vapors of the first retorts, for the purposes described.

3. The condensers C D, provided with condensing-coils C' D', and applied, in combination with each other and with the retorts R^{i} R^{ii} R^{xii}, substantially in the manner and for the purposes set forth.

4. Tapping the condensing-coils C' or D' at different levels, substantially as and for the purposes described.

5. The coking retorts R^{xiii} R^{xiv} (two or more), applied, in combination with the retorts R^{i} R^{ii} R^{xii}, substantially as and for the purpose specified.

A. H. TAIT.
JOSEPH W. AVIS.

Witnesses:
M. M. LIVINGSTON.
WM. F. McNAMARA.

(Here follows diagram marked p. 273.)

274 DEFENDANT'S EXHIBIT D. C. B. H., Sp'l Ex'r.

UNITED STATES PATENT OFFICE.

E. G. KELLEY, of New York, N. Y., and A. H. TAIT, of Jersey City, N. J.

Improvement in Apparatus for Distilling Oils.

Specification forming part of Letters Patent No. 32568, dated June 18, 1861.

To all whom it may concern:

Be it known that we, E. G. Kelley, of the city, county and State of New York, and A. H. Tait, of Jersey City, in the county of Hudson and State of New Jersey, have invented a new and improved apparatus for distilling oil; and we do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a longitudinal vertical section of our invention, the line *x x*, Fig. 2, indicating the plane of section. Fig. 2 is a horizontal section of the same, taken in the plane indicated by the line *y y*, Fig. 1.

Similar letters of reference in both views indicate corresponding parts.

This invention consists in the arrangement of a series of retorts one above the other in the same furnace, in combination with a suitable supply-pipe, and with overflow-pipes, and with a steam-pipe, the steam passing through which is superheated by running it down through the interior of the furnace, and which communicates with each of the retorts in such a manner that the crude oil supplied to the uppermost retort, and running from the same by the overflow-pipes to the lower retorts, is gradually heated, and the vapors of the oil mixed with the superheated steam are carried into one or more condensing-chambers, where both the vapors of the oil and the steam are condensed by the action of one or more jets of water introduced through suitable roses, and that by thus mixing the vapors of the oil with steam and condensing them simultaneously with the steam the oil is refined and deodorized by one operation.

It consists also in connecting the several retorts by means of pipes in such a manner that the vapors formed in all the retorts are returned to the highest retort, from which they pass off into the condensing-chamber.

To enable others skilled in the art to make and use our invention, we will proceed to describe its construction and operation with reference to the drawings.

A series of retorts, A, of cast iron, clay, or any other suitable material, are arranged in the interior of a furnace, B, built of brick sufficiently high to admit eight (more or less) retorts, one above the other, as clearly shown in Fig. 1 of the drawings, and so constructed that it also serves as chimney. Two or more dampers, *a*, at or near to its upper extremity serve to regulate the draft of the fire, and a grate, *b*, with an ash-box, *c*, completes the furnace. A tank, C, on the top of the furnace, and supported by suitable braces, receives the crude oil, and a pipe, *d*, forms the communication between this tank and the uppermost retort. The several retorts communicate with each other by means of overflow-pipes *e*, that are so arranged that a continuous flow of the oil downward is effected, and a regular depth maintained in each retort. The lowest retort or retorts are furnished with discharge-cocks, *f*. The oil in the retorts is mixed with superheated steam, that is introduced through a pipe, D, the upper end of which connects with a steam-boiler, and which enters the furnace at or near its top, and after passing down through the entire height of the same emanates at or near its bottom, whence it bends upward, communicating with the several retorts through branch pipes *g*, as clearly shown in the drawings. In passing down through the interior of the furnace the steam is superheated, and as it reaches the several retorts its temperature is equal, or nearly so, to that of the oil contained in the same, and it readily mixes with the vapors of the oil and passes off with them through the pipes $h\ h'$ into the condensing chamber or chambers $E\ E'$. These chambers, which like the furnace are built up of brick or of any other suitable material, are separated from each other by a partition, *i*, and they are used one to condense the light and the other the heavy oils.

To effect the separation of the oils the pipes h', which conduct the vapors from the lower retorts to the condensing-chambers, are provided with branch pipes h^* and stop-cocks h'^* and h''^*, so that by shutting the cocks h'^* and opening the cocks h''^* the vapors from these retorts pass into the condensing-chamber E'. The condensation is effected by jets of water introduced from a water-tank, F, through roses G into the chambers $E\ E'$. As the cold water comes in contact with the vapors of the oil and steam the latter are condensed simultaneously, and the condensed water and oil, together with the condensing-water, accumulate on the bottom of the
275 chambers $E\ E'$, the water below and the oil on its surface, the quantity of oil and water contained in said chambers being indicated by glass gages *j j*, that are inserted into the sides of the chambers. The non-condensible or very volatile gases contained in the vapors of the oil and steam pass off through the chimney H, and a rose, I, which allows of throwing cold water into said chimney, serves to condense such condensable vapors, which may yet be mixed with the gases passing off through the chimney. The water which accumulates at the bottom of the chambers $E\ E'$ runs off through the overflow-pipes $K\ K'$, and the oil through the pipes $l\ l'$, with faucets $m\ m'$ to draw off the light oil from one and the heavy oil from the other chamber.

The principal advantages of this apparatus are derived in the first place from the manner of arranging the retorts in the furnace, one above the other, and from the connecting overflow-pipes, whereby the oil is gradually heated as it descends from the highest to the lowest retort, and an explosion is rendered almost impossible. Furthermore, by the introduction of superheated steam the evaporation is facilitated, and the vapor of the oil is made to pass readily with the steam into the condensing-chambers, and as the vapor of the oil is brought in direct contact with the condensing-water, and condensed simultaneously with the steam, the miasms or atoms which are the cause of the disagreeable smell of the oil are precipitated with the water, and the oil is refined and deodorized by one operation. Besides this, the light and the heavy oils can be separated from each other by the aid of my apparatus in a very convenient and expeditious manner.

In some cases it may be desirable to rectify the oil without the aid of steam, and in such cases the pipes *e** are used in combination with the connecting-pipes *e* to cause the vapors from all the retorts to pass up to the highest retort, from which the whole mass of vapors is conducted to the condensing chamber or chambers. In this case—that is, when it is desired to use the pipes *e e** for the purpose of returning the vapors to the highest retort—all the pipes *h′ h*, with the exception of that pipe which connects the highest retort with the condensing-chambers, have to be closed by suitable stop-cocks, as indicated by red outlines in Fig. 1 of the drawings. By stopping these pipes the vapors are compelled to pass up through the pipes *c e**, while at the same time the oil drips down through the pipes *c*.

Having thus fully described our invention, what we claim as new, and desire to secure by letters patent, is—

1. The arrangement of a vertical range of retorts, A, in an upright furnace, B, in combination with the supply-pipe *d*, connecting overflow-pipes *e*, steam-pipe D, and branch-pipes *g*, all constructed and operating in the manner and for the purpose shown and described.

2. The combination of the vertical range of retorts A, steam-pipes D, and one or more condensing-chambers, E E′, substantially as and for the purpose described.

3. The arrangement of the pipes *e** in combination with the vertical range of retorts A, and connecting-pipes *e*, as and for the purpose set forth.

E. G. KELLEY.
A. H. TAIT.

Witnesses:
M. M. LIVINGSTON,
LEWIS A. TUCKER.

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276 DEFENDANT'S EXHIBIT E.

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE.

To all persons to whom these presents shall come, Greeting:

This is to certify that the annexed is a true copy from the files of this office of the specification and drawing in the matter of the letters patent granted Perkins and Burnet April 4, 1865, number 47125, for improvement in apparatus for refining or distilling petroleum and other products.

PERKINS & GORAL.

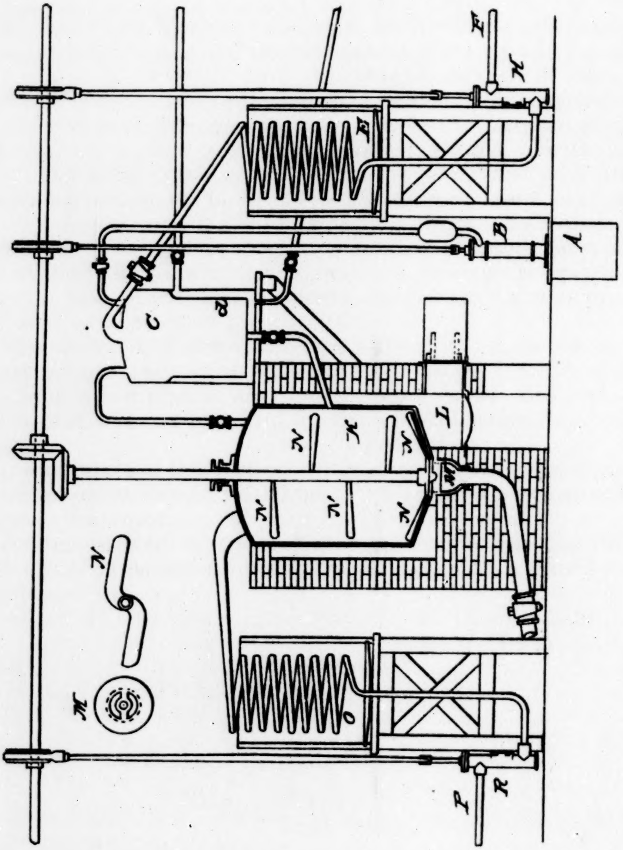
No. 42,120.

PERKINS & BURNET.

Oil Still.

No. 47,125. Patented April 4, 1865.

No. 271
V. O. Co.
v.
B. L. O. Co } p. 277



Witnesses
Daniel F. Tompkins
Elias Taylor

Inventors
James Perkins
William A. Burnet

In testimony whereof I, E. M. Marble, Commissioner of Patents, have caused the seal of the Patent Office to be affixed this 30th day of June, in the year of our Lord one thousand eight hundred and eighty-three, and of the Independence of the United States the one hundred and seventh.

[L. S.] E. M. MARBLE,
Commissioner.

(Here follows diagram marked p. 277.)

278 *Specification Forming Part of Letters Patent No.* 47125, *Dated April 4th,* 1865.

To all to whom it may concern:

Be it known that we, James Perkins and William H. Burnet, of the city of Newark, in the county of Essex and State of New Jersey, have invented certain new and useful improvements in apparatus for refining or distilling petroleum and other products, and we do hereby declare that the following is a full, clear and exact description of the same, reference being had to the accompanying drawings making a part of the specification.

The nature of our invention consists in the introduction and use in the apparatus, in connection with the main receiver, of one or more separate and independent receivers into which the petroleum to be refined is first introduced, and from which, by means of steam or other sufficient heat the lighter oils and gases, such as naphtha and benzine are evolved or liberated, the whole apparatus taken together operating to permit of a constant and uninterrupted process of refining the petroleum or other products.

Our invention further consists in the introduction and use in the main receiver of an agitator and cleanser worked by power for the purpose of both agitating the petroleum to facilitate evaporation and also to clean the bottom and sides of the receiver in the manner shown.

Our invention further consists in the attachment and use, in
279 connection with the said receiver, of an exhaust pump or exhaust pumps to accelerate the evaporation by the removal of pressure from the receivers.

In the drawings, A is the reservoir containing the crude petroleum or other products to be refined; B is the pump by which the petroleum is elevated into the receiver C.

C is for the purpose of liberating and disposing of the lighter oils and gases, such as naphtha and benzine. This is done by the heat of steam introduced into the steam jacket D around C. The naphtha and benzine passes from C in vapor through the condenser E and, being there condensed, is at last discharged through the pipe F, the whole process being facilitated by the use of the exhaust pump H. The petroleum in C (the naphtha and benzine being separated therefrom) is now discharged or permitted to flow into the main receiver K, when it is subjected to the heat of the furnace L or, if desired, steam may be employed in the same manner as at C.

The receiver or pipe M underneath K and forming a part thereof is for the purpose of collecting and removing the residuum and sediment of the petroleum. The collection and deposit of the residuum and sediment is facilitated and forced by the action of the rotary or other agitator or stirrer N, which may be made and applied in any desired form or way, as experience may show to be best, and if found useful the same may be introduced into and used in the receiver C; also, as shown in the drawing, the upper wings of N operate to agitate the petroleum and so to facilitate the evaporation and prevent foaming, whereas the lower wings of N operate more directly to cleanse the bottom of the receiver and to collect and force (being set and shaped for that purpose) the sediment and residuum into the lower pipe or receiver M, from which it may at any time be discharged or withdrawn without putting out the fire or otherwise interrupting the process of refining the oil.

280 As the process goes on, the petroleum in the form of a vapor passes from the receiver K through the condenser O and is discharged in a condensed form at P, the exhaust pump R operating, as in the case of the receiver C, to facilitate the evaporation by removing the pressure from the receiver K.

Claims.

What we claim as our invention, and desire to secure by letters patent of the United States, is—

First. We claim the combination of the receivers C and K with the agitator N, and sediment receiver M, substantially in the manner and for the purposes prescribed.

Second. We claim the combination of the parts C, E, K, N, and O, substantially in the manner and for the purposes described.

Third. We claim the use of the exhaust pumps H and R in combination with the distilling and condensing apparatus described, substantially in the manner and for the purposes set forth.

JAMES PERKINS.
WILLIAM H. BURNET.

Witnesses:
DANIEL F. TOMPKINS.
ELIAS TAYLOR.

Examined and delivered.—C. F.

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281 DEFENDANT'S EXHIBIT F.

UNITED STATES PATENT OFFICE.

HUOT FLEURY, of New York, N. Y.

Improvement in Distilling Petroleum.

Specification forming part of Letters Patent No. 50571, dated October 24, 1865.

To all whom it may concern:

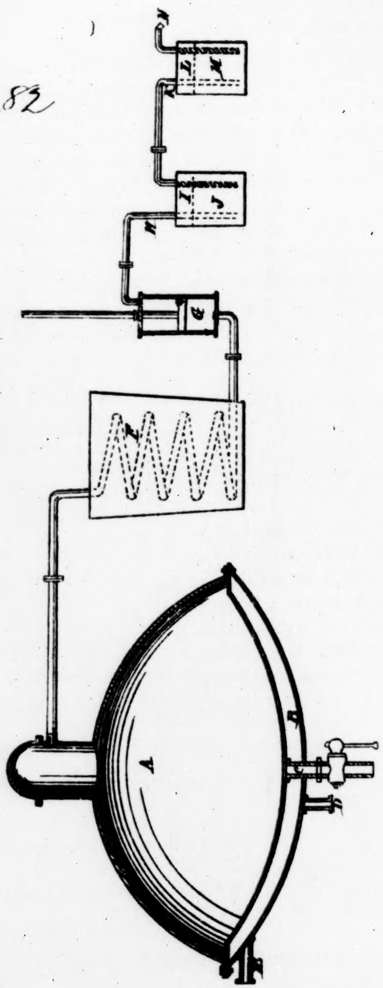
Be it known that I, Huot Fleury, of the city and county of New York, in the State of New York, have invented a new and improved

H. FLEURY.

Oil Still.

No. 50,571. Patented Oct. 24, 1865.

No. 241
V.O.Co.
v
B.L.O.Co.
p. 282



Witnesses:

Arthur J. Sheldon
Thomas H. Kerney

Inventor:

Henri Fleury

mode of distilling and rectifying petroleum-oil; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The nature of my invention consists in the distillation of petroleum-oil by a vacuum, and its rectification by one single operation, by means of the apparatus and process hereinafter described.

A is a boiler in which the crude petroleum-oil is first put; B, double bottom, where the steam of a generator is caused to come; C, emptying-tube, provided with a cock in order to allow the residue to flow out after the operation is ended; D, tube to allow the stream of condensed water to escape; E, tube through which enters the steam intended to heat the boiler A; F, serpentine intended for the condensation of petroleum-steam: G, a pump intended to cause the vacuum to take place in the boiler A, and which throws back the petroleum-oil through the tube H in the vase J, which is filled up to the line I with sulphuric acid at 66°.

The oil, by going through the sulphuric acid, leaves in it the tar matters which would have been dragged along in the distillation. It then goes through the tube K, in order to pass through a solution of potash or of caustic-soda, at 40°, contained in the vase M, which is filled up to the line L. The potash takes off the sulphuric acid, which would have been dragged along. The oil, purified in that manner, runs out through the tube N, where it has only to be received, and then the light to be separated from the thick oil.

The advantage of this process consists, first, in operating the distillation at a very low temperature, which prevents at first the decomposition of a certain quantity of oil, which always happens at the end of the distillation through the old process; second, the whole operation is made without any manipulation being needed for the treating of the oil with sulphuric acid or potash, as it used to be done hitherto; third, during all the treatment the oil is entirely screened from the air; fourth, the oil obtained through that process is perfectly white, without it being necessary to decolor it.

What I claim as my invention, and desire to secure by letters patent, is not the apparatus itself, but

The new mode or process of distilling and rectifying petroleum-oil, as above described, taken altogether, and of which the apparatus is only a necessary part.

HUOT FLEURY.

Witnesses:
ARTHUR E. SHELDON.
THOMAS KEESAN.

(Here follows diagram marked page 282.)

283 DEFENDANT'S EXHIBIT G.

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFCE.

To all persons to whom these presents shall come, Greeting:

This is to certify that the annexed is a true copy from the files of this office of the specification and drawing in the matter of the letters patent granted Henry P. Gengembre June 21, 1859, number 24454, for improvement in oil still.

In testimony whereof I, E. M. Marble, Commissioner of Patents, have caused the seal of the Patent Office to be affixed this 30th day of June, in the year of our Lord one thousand eight hundred and eighty-three, and of *the* Independence the one hundred and seventh.

[L. S.] E. M. MARBLE,
Commissioner.

(Here follows diagram marked p. 284.)

285 *Specification Forming Part of Letters Patent No.* 24454, *Dated June* 21, 1859.

To all whom it may concern:

Be it known that I, Henry P. Gengembre, of Allegheny City, in the county of Allegheny and State of Pennsylvania, have invented a new and useful improvement in apparatus for the destructive distillation of oleiferous minerals, such as shale, bituminous slates, cannel coal, for the purpose of extracting therefrom oils and tars; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the annexed drawing, forming part of this specification, which is a sectional elevation of my improved apparatus.

My invention consists in the combination and arrangement of the various parts of my apparatus, as hereinafter described, for the purpose of excluding the coal or other substance under treatment, as well as the product of distillation, from all contact with atmospheric air until it is fully cooled, and of creating and keeping up a strong and uninterrupted circulation of permanent gas through the retort or generator and condensing worm in a direction opposite to the course of the coal or other subject of distillation, thereby facilitating the generation of oleaginous vapor and increasing the yield of oil and diminishing the relative quantity of permanent gas; also in the use of an L-shaped retort, furnished with charging boxes so
286 arranged and constructed as to prevent the access of any atmospheric air to the interior of the retort, and the combination therewith of a coal crusher at that point of the retort where its contents are exposed to a slight degree of heat, sufficient to volatilize the lighter oils.

To enable others skilled in the art to make and use my improved apparatus, I will proceed to describe its construction and operation:

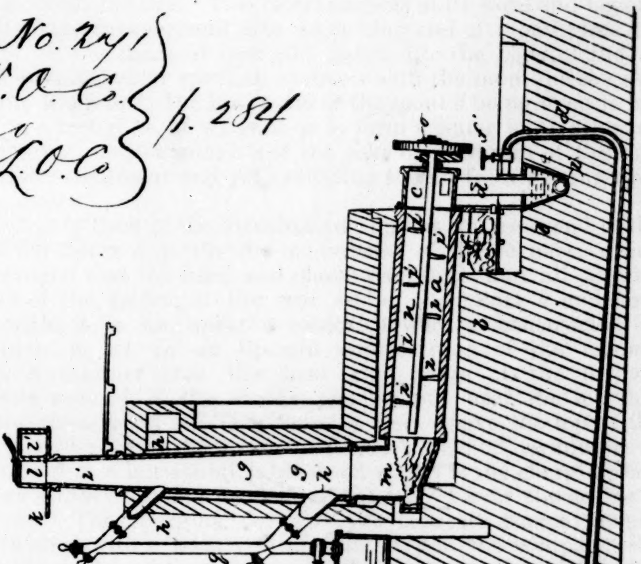
In the drawing *a* is a cylindrical retort made of fire-clay, iron,

H. P. GENGEMBRE.

Oil Still.

No. 24,454. Patented June 21, 1859

No. 241
V. O. Co.
B. L. O. Co.
p. 284



WITNESSES
J Merlin Cooper
Martin G Cushing

INVENTOR
Henry P Gengembre

brick or other suitable material, though I prefer the use of a clay retort as being more susceptible of an uniformly low degree of heat, such as is necessary for the generation of oleaginous vapor as distinguished from permanent gas. This retort *a* is set in a suitable furnace, *b*, in a slightly inclined or nearly horizontal position, the front or fire end of the retort being lower than the rear end, which is farthest from the fire. This retort projects at its front end beyond the wall of the furnace, and this projecting end of mouthpiece *c* of the retort may be made of iron and fastened to the body of the retort. A perpendicular spout, *d*, connects with the mouthpiece *c* and opens into the retort; the lower end of the spout *d* being open is immersed in a trough, *e*, of water so as to form a water joint, allowing the discharge into the trough *e* of the coke or residuum of the substance under treatment and yet excluding the air from passing up it into the retort.

Immediately back of the mouthpiece *c* and at the front end of the body of the retort *a* is the fire chamber *f* of the furnace, which is so arranged that the heat and flame pass back and all around the body of the retort; at the rear end of the retort *a* and connected with it is an upright conical tower, *g*, constructed of iron, which is set in an upright continuation of the furnace in such a manner that the heat and flame of the furnace pass around it, the smoke passing out near the top into 287 the chimney at *h*. This tower *g* rises above the top of the upright part of the furnace, as seen at *i*, and terminates at its upper end in a horizontal table, *k*, on which is the charging box *l l'*, which slides back and forward on the table *k* over the orifice of the tower *g*. The charging box has two separate compartments, each furnished with a tightly-fitting lid. When the compartment *l* is over the orifice of the tower *g* its lid is kept closed, which shuts up the orifice and prevents the admission of any atmospheric air; but the other compartment, *l'*, not being in communication with the orifice of the tower, may be filled with coal or other substance to be distilled, ready to charge the tower, which is effected by shifting the box over to the other side of the horizontal table *k*, when its contents are discharged into the tower *g* of the retort, and the compartment *l* is in its turn ready to receive a charge to be fed into the tower when necessary. At the bottom of the tower *g*, which is the rear end of the horizontal retort *a*, is placed a revolving crusher, *m*, rigidly attached to and revolving with the shaft *n*, which passes through the centre of the cylindrical horizontal retort *a*. This shaft *n* passes through the front end or mouth-piece *c* of the retort, and is caused to revolve by power applied to the cog-wheel or drum *o*. The shaft *n* is furnished with vanes, *i i*, etc., which project at right angles from the shaft at intervals throughout its length. These vanes *i* are set so that the flat surface of each is in a plane not at right angles to the axis of the retort, but slightly inclined, so as not only to stir the contents of the retort, but also to move them gradually forward towards the front end of the retort, where the charge, as it is exhausted, is continually discharged through the perpendicular spout *d*. The teeth of the crusher *m* are two inches in length, varying in

shape and number according to the nature of the coal to be
288 treated, and set at an angle with the angle of the shaft, — as
not only to break up the charge, but to cause it to pass into the horizontal retort *a*. The retort *g* has two or more exits, *p p*, at different points, to equalize the discharge of the volatile products and allow them to pass off without remaining longer than necessary exposed to the heat of the retort, which would tend more or less to convert them into permanent gas.

These exits *p p* open into a perpendicular pipe, *q*, which terminates below in the tank or main *r*, in which the less volatile product of distillation and any tar which may be formed are collected. The goose-neck *s* serves to discharge the contents of the tank as they accumulate without allowing the entrance of any air. The pipe *t* carries off the oleaginous vapor which does not immediately condense in the tank *r* and connects with worm *u u* in the refrigerating cistern *v*, where the condensible vapor is separated from the permanent gas, which latter rises through the upright pipe *w*, while the oil and other fluid products of distillation condensed in the refrigerating worm *u* pass off through the goose-neck *s* into any receptacle placed to receive them, while the entrance of the atmospheric air at this point also is by the goose-neck effectually prevented.

The permanent gas passing through the pipe *w* enters the washing vessel *x*, which is kept nearly full of water. The diaphragm *y* immersed in the water, being made with transverse ribs, causes the gas to pass up and down through the water before it reaches its exit at the pipe *z*. The pipe *z* is closed at top by a valve, *a′*, which opens upward into the cylinder of an exhaust and force pump, *b′*, with a solid piston, *c′*, by which the permanent gas is drawn off from the retorts through the series of pipes, worm, and washing vessel on each upstroke of the piston and forced through the pipe *d′* on each
down-stroke. The pipe *d′* connects the escape pipe *e′* of the
289 force pump *b′* with the upright spout *d* at the front end of the
horizontal retort *a*, so that the permanent gas, after leaving the condensing apparatus, is returned into the retorts in a continuous stream. The throttle valve *f′* in the pipe *d′*, near the spout *d*, serves to regulate the flow of gas into the retorts, and a safety valve *h′* regulates the presence of the gas in the retorts and allows it to escape when it accumulates in too great quantity in the apparatus.

In the trough of water *e*, just below the end of the spout *d*, is an endless screw, *i′*, which carries off the coke or other residuum of distillation as it is discharged from the retorts through the spout *d*.

Any convenient number of L-shaped retorts constructed as before described may be placed side by side, each having its pipe, *q*, terminating in the main or tank *r*, which is made long enough to answer that purpose. The rest of the apparatus for condensing the oleaginous vapors and separating the permanent gas, if made correspondingly large, will treat the products of a series of such retorts.

Having thus described my improved apparatus for the extraction of the fluid products of coal and other oleiferous minerals or substances by destructive distillation, I will briefly explain its operation.

The coal or other substance to be treated being broken up into pieces is placed alternately in one or other of the compartments *l* or *l'* of the feeding box, and is fed into the top of the tower retort by pushing the filled compartment over the mouth of the retort *g*. The tower retort is kept filled up to the top of the brick-work of the furnace not far from the top of the tower retort. The coal gradually sinks into the tower as it is fed into the horizontal retort *a* by the crusher *m*.

290 The heat is, of course, greatest immediately over the fire which is at the front end of the horizontal retort *a* and gradually diminishes towards the rear end of the retort at the foot of the tower retort *g*, and grows still less towards the top of the tower retort. Thus the coal at the tower, retort is exposed to but slight heat, and as it sinks in the retort it is gradually subjected to an increased degree of heat, which, at the bottom of the tower retort, where the crusher is situated, is sufficient for the volatilization of the lighter oils. The coal in the tower retort is thus gradually heated, and some of the oleaginous vapor is driven off and escapes through the exits *p p* before the coal leaves the tower. This heating of the coal has the effect of rendering it very easy to break up, so that the crusher readily divides it into small pieces before it enters the horizontal retort *a*. The coal thus descends through the tower retort, passes into the horizontal retort, and when exhausted of all its volatile particles the coke or other residuum is discharged through the spout *d* into the trough of water *e* and is carried off by a screw or conveyor, *i'*.

During the whole time that this process of distillation is being carried on, and which may be continued with intermission, there is a stream of permanent gas which is forced by the air pump or exhauster *b'* through the pipe *d'* in the direction of the arrow, and which enters the spout *d* just below the mouth-piece *c* of the retort *a*, the quantity of gas introduced being regulated by the throttle valve *f'*. This stream of permanent gas thus forms a strong and continuous current passing through the retort, and entering the hottest part of the retort and passing through the hot coke or residuum it becomes itself heated and greatly facilitates the generation and liberation of the oleaginous vapors from the coal. This current of heated gas is forced through the coal in the retorts in a direction opposite to that in which the coal is travelling, and, passing upward and through the exits *p p*, carries with it the oleaginous vapors, which thence pass down the pipe *q* into the
291 tank *r*. Here the heavy oil which is condensed by passing through the pipe *q* is deposited, with any tar and other heavy products of distillation, which are drawn off through the goose-necks. The vapors thence pass through the worm *u*, in the refrigerating cistern *v*, and all the condensable products are deposited in the bottom of the pipe *w*, and pass off through the goose-neck *s'*. The permanent gas thence passes through the water vessel, where it is well washed by passing around the ribs of the diaphragm *y*, and thence into the exhauster *b'*.

The pump or exhauster *b'*, by drawing the gas from one end of the apparatus and forcing it in at the other, causes the current of gas to flow rapidly through the apparatus and thus carries off from the retorts the vapors as soon as generated, thus removing them as speedily as possible from the heat of the retorts and preventing their being converted into permanent gas, which is very apt to occur if they are long exposed to heat.

I have described the exhauster used by me as a force pump, but any other well-known device may be employed to produce a similar result.

Having thus described my improved apparatus for the dry distillation of coal and other oleiferous substances, I do not claim therein as new the use of cylindrical retorts, nor the use of horizontal shafts with contrivances thereon for agitating or moving forward the contents of the retort, neither do I claim originality in the use of the mouthpiece *c* of the retort and spout *d*, nor in the crusher itself considered or otherwise than in the position and combination hereinbefore described, nor in the pump for exhausting the apparatus and forcing the gas.

But what I do claim as my invention, and desire to secure by letters patent, is:

292 First. The use of an L shaped retort combined with charging boxes, crusher, and discharging tube as described capable of being subjected to a degree of temperature at the end of the horizontal part at which the residuum of the substance under treatment is discharged higher than at the upright part at which the coal is charged, the whole so arranged as to avoid the admission of atmospheric air.

Second. The combination with my retort constructed substantially as hereinbefore described, of a crusher suited to the material to be distilled, placed within the retort at a point intermediate between the points where the heat is highest and lowest, for the purpose of breaking up the coal or other substance before the process of distillation is complete.

H. P. GENGEMBRE.

Witnesses:
J. MASLIN COOPER.
MARTIN G. CUSHING.

Ex'd: E. McK., C. E. A.

(Here follow diagrams marked pp. 293 & 294.)

DEFENDANT'S EXHIBIT H.

~~C. B. H.~~ SPL. EXR.

2 Sheets—Sheet 1.

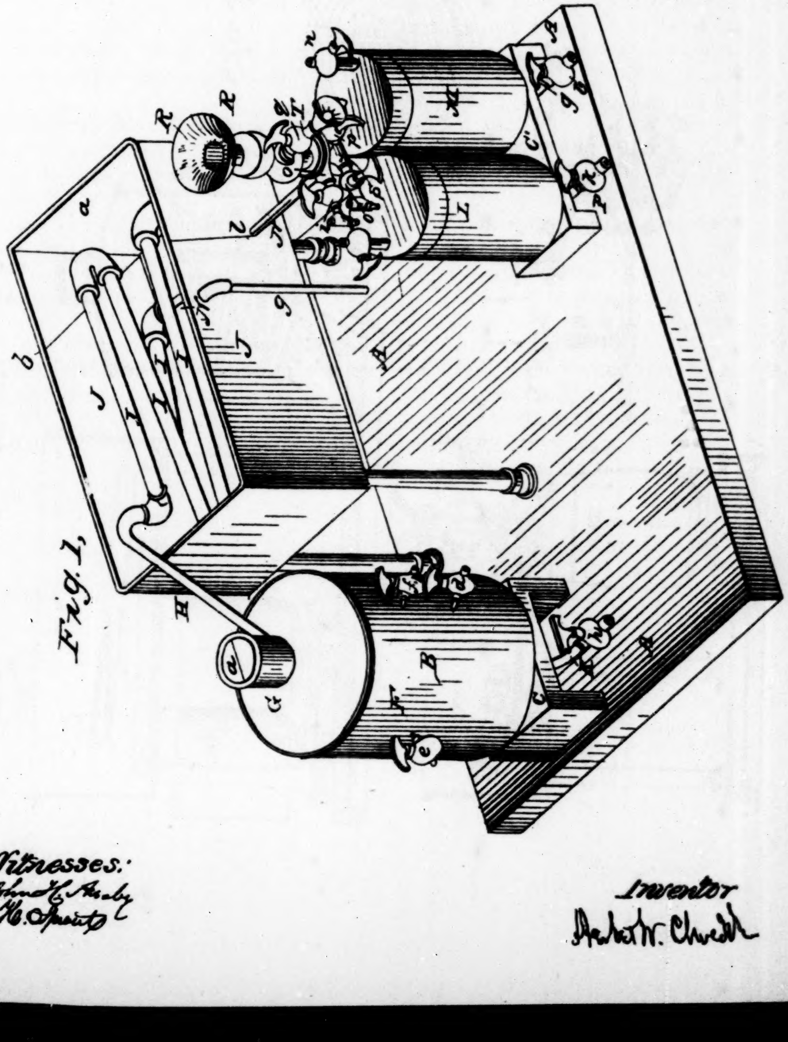
H. W. C. TWEDDLE.

Oil Still.

No. 2,404.

No. 271
V. O. Co.
v.
B. L. O. Co.
p. 293

Reissued Nov. 27, 1866.



Witnesses:

Inventor

295 DEFENDANT'S EXHIBIT H. C. B. H., Sp'l Ex'r.

UNITED STATES PATENT OFFICE.

HERBERT W. C. TWEDDLE, of Pittsburgh, Pennsylvania.

Improved Apparatus for Distilling Coal-Oil and Other Substances.

Specification forming part of Letters Patent No. 34324, dated February 4, 1862; reissue No. 2404, dated November 27, 1866.

To all whom it may concern:

Be it known that I, Herbert W. C. Tweddle, a citizen of England, and resident of Pittsburgh, in the State of Pennsylvania, have invented a new and useful improvement in the process of distillation of petroleum and other hydrocarbon oils or fats of any description; and I do hereby declare that the following is a full, clear, and exact description of my said invention, and of the apparatus which I employ in its practical application.

My invention consists in distilling petroleum and other hydrocarbon oils and fats under a vacuum or partial vacuum, in combination with the use of steam for producing the vaporization of the article to be distilled; also, in the use of superheated steam for distilling hydrocarbon oils and fats under a vacuum or partial vacuum.

The principal objects of my invention are to conduct the operation of distillation at a lower and more uniform degree of heat than is required by the ordinary modes of distillation, and to remove the danger arising from the direct application of fire to the stills containing the oil to be distilled.

In the distillation of petroleum by means of fire applied to the stills, the heat requires to be run up to from 530° to 580° Fahrenheit, in order to distill over the heavy products at the latter part of the operation. Such a high heat injures the stills and causes them to leak, and many serious accidents have occurred from this and other causes incident to the proximity of fire to these highly-inflammable oils and the gases generated therefrom in the process of distillation. It is also very difficult to regulate the heat of a furnace so as to carry on the distillation to the best advantage, and the consequence is that a large amount of oil is lost by the destructive distillation of the oil and the formation of permanent gas.

If the process of distillation is carried on under a vacuum or partial vacuum, the heat required is considerably less, being only about 380° Fahrenheit in cases where 580° would be required without the vacuum.

To obtain the degree of heat (say 380° Fahrenheit) required at the latter stages of the process of distillation by the use of steam, it is necessary to have a pressure of about two hundred pounds to the square inch in the steam-generator, which is fraught with danger, and is liable to injure the steam-pipes and still, and cause leakage. Thus, although the heat produced by steam is much more beneficial, so far as the effect on the distillate is concerned, the difficulty and danger attending the production of the high temperature required at the latter part of the operation, even if a vacuum is created in the still, renders its adoption in this way unadvisable. By superheating the steam, however, this difficulty is effectually surmounted, because much less pressure is required, so that by the use of superheated steam, in combination with a vacuum or partial vacuum, I am enabled to distill over the heavy products of distillation of petroleum and other oils, and at the same time avoid, in a great degree, the decomposition of the oils into noncondensable gas and the elimination of solid carbon in the shape of coke or tarry residuum, which is deposited in the bottom of the stills when fire heat is employed.

The apparatus employed may be variously constructed and arranged, and the vacuum may be produced by means of an air-pump, water-column, or by means of the device hereinafter described.

To enable others skilled in the art to make use of my invention, I will proceed to describe the apparatus which I use for this purpose, referring to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a perspective representation of my apparatus. Fig. 2 is a longitudinal sectional elevation through the line *x x* in Fig. 1. Fig. 3 is a transverse sectional elevation through the line *z z* in Fig. 1. Fig. 4 is a perspective representation of the coil of steam-pipe detached from the still. Fig. 5 is a perspective view of the distributer. Fig. 6 is a vertical section through the line *x x*, Fig. 5.

Like letters refer to the same parts in all the figures.

In the drawings, A is the foundation or base, on which the apparatus is set. B is the still, which may be of any desired shape, set on a raised pedestal, C, to allow of the insertion of the waste-pipe K into the bottom of the still, for emptying it when desired, and removing any residuum which may be deposited in the
296 still during the process of distillation. The waste-pipe K is
opened or closed by a stop-cock, *h*. The still is supplied with oil to be heated through the supply-pipe D, which is furnished with a stop-cock, *a*, to open or close the connection of the still with a reservoir of oil placed in any convenient position, and with which the pipe D is connected. E is a distributer for the superheated steam, consisting of a central pipe and radial arms *b b*, and a rim composed of segments of an annular pipe, *c c*, attached to the extremities of the radial arms *b b*. The radial arms *b b* and rim-pieces *c c* are perforated with small holes *d d*, to insure an equal distribution of superheated steam in the interior of the still. From the dome G of the still B a goose-neck or pipe, H, conducts the products of distillation to the coil of condensing-pipes I I, placed in a refrigerator or cold-water tank, J, into which tank a stream of cold water is continually running, an overflow pipe, *g*, being inserted into the side of the tank J, above the level of the pipes I I, so as to keep them sub-

merged in the cold water. The lower end of the coil of condensing-pipes I I (farthest from the still) connects with a pipe, N, which opens into a short branch pipe, O, one end of which enters the top of the receiver L, and the other end enters the top of the receiver M, the stop-cocks *i* and *j* serving to connect or disconnect either of the receivers L and M with the flow-pipe N. By this arrangement the distilled oil runs into one or other of the two receivers L and M, as may be desired. The receivers L and M may be placed side by side on a stand, C′, and the pipes P and Q, furnished with cocks *k* and *l*, respectively, serve to draw off the distilled oil from the receiver.

Fig. 4 represents a coil of pipe, F, inserted in the still B, as shown in Fig. 2, so as to be covered by the oil to be distilled. This coil is heated by steam introduced through the cock *e* at one end of the pipe, and passing out when necessary at the blow-pipe *f*, at the other extremity.

The device which I employ for producing a vacuum or partial vacuum in the receivers is shown in Figs. 1 and 3. Connecting the two receivers L and M is a short pipe, S, opening at one end into the receiver L, and at the other end into the receiver M, furnished with stop-cocks *o* and *p*, by opening and closing which the vacuum apparatus is connected with one or other of the receivers, at pleasure. On the branch pipe S, between the stop-cocks *o* and *p*, is placed a short vertical pipe, *s*, which opens into the pipe S at its lower end. This pipe *s* is surrounded by a hollow globe, *t*, so that the extremity of the pipe *s*, which is slightly tapering upward, is situated in the cavity of the globe, above its center. On top of the globe *t* is a funnel, R, the lower end of which enters the cavity of the globe *t*, the mouth of the funnel at its lower end, at *v*, flaring outward slightly, as seen in Fig. 3, and extending down to and immediately over the top of the pipe *s*. On one side of the globe *t* is a pipe, T, for admitting live steam into the cavity of the globe, which pipe is furnished with a stop-cock, *q*, for shutting off the steam when the vacuum apparatus is not required to be in operation.

When steam is admitted through the pipe T into the vacuum-globe *t*, it rushes up through the funnel R, all around the mouth of the upright pipe *s*, with so much force as to draw out the air or gaseous contents of the branch pipe S, and also from whichever of the receivers L or M may be in connection with it. This also produces a vacuum through the condensing-pipes I I, which are connected by the pipe N with the same receiver, L or M, that is in connection with the vacuum apparatus, and also in the still B. Air-cocks *m* and *n* are placed one on top of each of the receivers L and M, to admit the atmospheric air into the receivers whenever it is desired to destroy the vacuum, for the purpose of checking the distillation or of drawing off the distilled oil from the receivers.

The operation of my apparatus is as follows: When the still is charged with oil to be distilled, and one of the receivers L or M, being empty, is connected, by opening the cocks, with the branch pipe O and condensing-coils I I, steam at from 80° to 120° Fahrenheit is admitted into the coil F to vaporize the oil in the still B. At the same time the vacuum apparatus is connected with a receiver which is in use (which is disconnected from the other), and steam is admitted through the pipe T, which produces a vacuum (more or less perfect) through the receiver, refrigerator, and still. By means of the withdrawal or reduction of the atmospheric pressure thus effected the distillation progresses very rapidly at a low temperature compared to that which would otherwise be required.

When all the oil is distilled which will pass over at the heat first employed I increase the temperature up to about one hundred and twenty pounds pressure to the square inch, after which I commence to use superheated steam, by which means I can safely attain any degree of heat which is requisite to distill the heavier oils remaining undistilled at the degree of heat previously employed.

The steam may be superheated in any ordinary manner. The coil F may be used for heating the oil with steam up to distilling temperature, and afterwards the steam-distributer E, for carrying on the distillation, or either of them alone, may be used, as may be preferred.

When either of the receivers, N or M, is filled, its connection with the still and with the vacuum apparatus is shut off, and the other receiver is put in connection with the apparatus, so that the filled receiver may be emptied without stopping the operation.

In addition to the advantages already stated as resulting from my
improvement, the oil resulting from distillation by the pro-
297 cess described is almost entirely devoid of the acrid and un-
pleasant odor of fire-distilled oils, and is almost colorless.
The quantity of illuminating oil thus produced from a given amount of crude petroleum is greater by from twelve to fifteen per cent. by my process.

My apparatus will last much longer than stills to which fire heat is directly applied. There is much less danger of leakage, as the vacuum causes pressure on the pipes from outside; and the frequent stoppage of the works, caused by the burning of the stills where fire is used, is entirely obviated. It is also a great advantage, incident to the dispensing with the use of fire under the stills, that the products of distillation may be safely discharged at a point near to the stills, so that the whole apparatus can be compactly located, and be all under the eye of the workman.

Having thus described my improvement, what I claim as my invention, and desire to secure by letters patent, is—

1. Distilling hydrocarbon oils, such as petroleum and other substances, under a vacuum, or partial vacuum, by the use of steam, for producing the vaporization of the article to be distilled.

2. The use of superheated steam, in combination with the employment of a vacuum or partial vacuum, for the distillation of petroleum and other hydrocarbon oils, and similar substances.

3. The combination of a steam vacuum apparatus, constructed substantially as hereinbefore described, with the oil-receivers L and M, for the purpose hereinbefore described.

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V.O. Co
v
B.L.O. Co } p.298

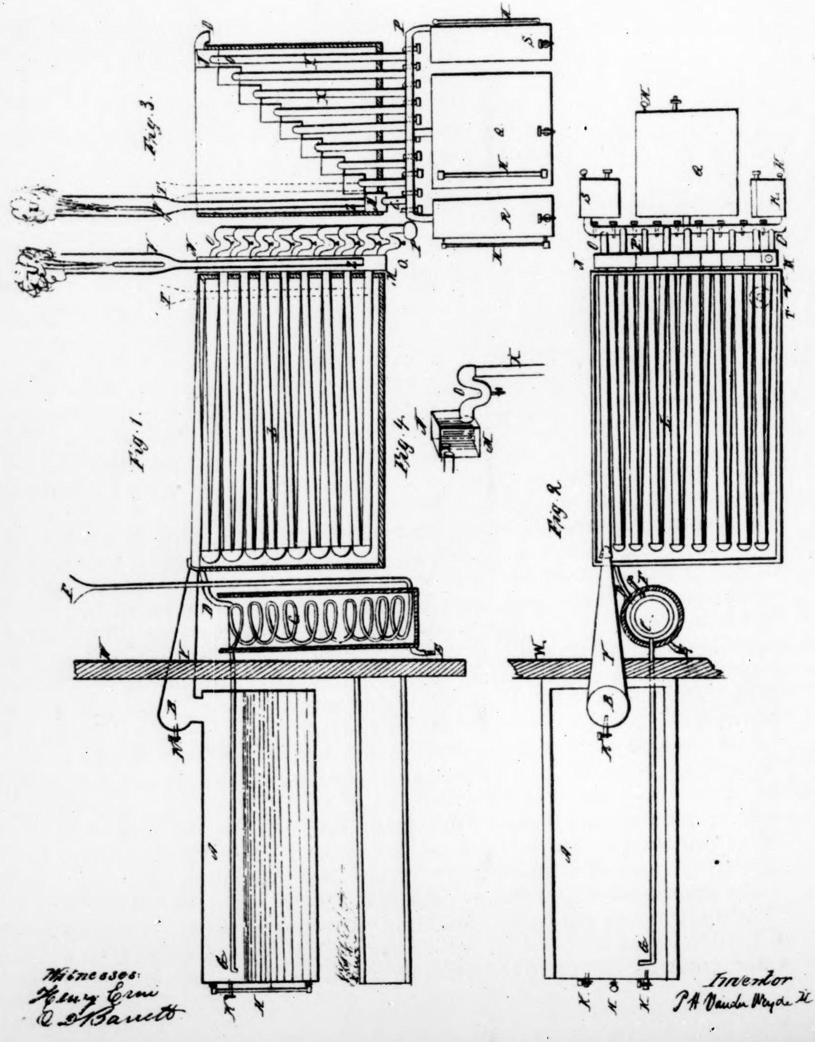
DEFENDANT'S EXHIBIT I.
~~Q.B.— SPL. EXR.~~

P. H. Van der Weyde,

Oil Still,

No. 58.005.

Patented Sep. 11. 1866



Witnesses:
Henry Erni
C. D. Barrett

Inventor
P H Vander Weyde

4. The combination of the vacuum apparatus hereinbefore described with the steam pipe or pipes in the interior of the still, and with the still, for the purposes hereinbefore described.

In testimony whereof I, the said Herbert W. C. Tweddle, have hereunto set my hand.

HERBERT W. C. TWEDDLE.

Witnesses:
A. S. NICHOLSON.
GEORGE H. CHRISTY.

(Here follows diagram marked p. 298.)

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299 DEFENDANT'S EXHIBIT I. C. B. H., Sp'l Ex'r.

UNITED STATES PATENT OFFICE.

P. H. VANDER WEYDE, of Philadelphia, Pennsylvania.

Improvement in Distilling Petroleum and Other Liquids.

Specification forming part of Letters Patent No. 58005, dated September 11, 1866; antedated August 8, 1866.

To all whom it may concern:

Be it known that I, P. H. Vander Weyde, chemist, of Philadelphia, in the State of Pennsylvania, have invented an improvement in distillation, the nature of which consists, first, in a tubular condenser, through which the vapor is drawn by a steam-jet, centrifugal blower, or other contrivance applied at the upper exit of the tube usually intended for the escape of the non-condensable gases, causing thereby a partial vacuum in the tubes and hastening the entrance of the vapor from the still in the same, which may be still more promoted by stop-cocks admitting air or passing in said non-condensable gases or other escaping vapors or steam, and thus driving on and condensing more rapidly all vapors; second, in providing the tubular condenser with eight, nine, ten, or more or less, exits for the condensed products, distributed at different distances through its whole length, so as to separate at once the products of different volatility and not mix them, as thus far was necessarily the case.

The following is a correct description of this invention, which will enable all others skilled in this business to make or use it, reference being had to the accompanying drawings.

A is the still, of the usual form, provided with a dome, B, and a stop-cock, K, opposite the exit Y, and intended to admit, as well as the other stop-cocks K, at the opposite end of the still, air or steam, or gases and vapors escaping from the tube V. H is a glass tube indicating the height of the liquid in the still, and W a brick wall separating the fire-room from the rest of the establishment.

The operation of the still is intended to be continuous; therefore a feeding-tube, G, conducts the crude oil or other substance in the still, after it has passed through C, containing the hot condensing-water, entering at D and escaping at E. This crude liquid ascends by the pressure in the column F through the coil C, and passes finally along or around the still A, in order to be heated before entering. During this heating process vapors will arise and enter the still, as the direction of this tube is continually upward from E to G.

The condenser is constructed of a rectangular water-tank filled with a number of straight iron tubes of the same length, connected at one end by a **U** and at the other end by a square cast-iron box, which is the principal feature of this invention, and therefore represented on a larger scale in Fig. 4. This box serves to collect and separate from the vapors all liquids condensed thus far, and to lead them, by O, X, and P, to their reservoir, and to give occasion to the non-condensed, and therefore more volatile, substances to pursue their course through the rest of the condensing tubes.

The box N M, Fig. 4, has two openings at the upper part at the back—one to admit vapor and liquid, the other to discharge alone vapor. The liquid is discharged from the box in front through O and X, and in order to cause liquid particles floating in the vapor to remain in this box, and to guard against them being mechanically carried onward with the vapors, a vertical wire-gauze is contrived, dividing this box into two parts between the two openings, so that all the vapor passes, as it were, through a sieve, and is more perfectly freed of liquid particles.

The tube T admits, as usual, cold water to the botttom of the tank, and it has its exit at the opposite upper end of the tank, at D, and serves then, as before remarked, to heat the ascending column entering the still. It is clear that by this arrangement the least volatile products, being first condensed, will collect in the box N, and by the tube X pass to the reservoir S for lubricating-oil. The more volatile portions will continue their course and gradually condense in the rest of the tubes, and we will find in the different successive boxes liquids of different degrees of volatility, till, finally, the most volatile substance will not be condensed before reaching the last box, M. This box is provided with the usual tube for the escape of the non-condensable gases, made, however, of the same caliber as the other tubes. At its upper part it is wider, to admit of the apparatus for exhausting, which may be an air-pump, or simply a steam-pipe, V, in its center, blowing a jet of steam upward. This steam, carrying with it the air in the tube, causes a partial vacuum behind it, and consequently a strong draft, in the same manner as it is produced
300 in the smoke-pipes of locomotive-engines; and in order that this partial vacuum shall act on the whole length of the condensing-tubes and still, the connections of the tubes X X with the reservoirs are air-tight or hermetically sealed; and before any liquid from the reservoirs can be drawn off the exhaust in V V is temporarily suspended. If an air-pump is used, its exit with safety-valve may be connected with the stop-cocks K to drive in the vapors escaping in V, or V may simply be connected with the stop-cocks K, and the air-pump be placed between the still and condenser.

Finally, in order to lead the different liquids to their proper reservoirs, the connecting-tube P is provided with a stop-cock between each of the descending tubes X X, so that if some kinds of petroleum

E. N. HORNER.

Oil Still.

No. 22,727. Patented Jan'y 25, 1859.

No. 241
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B.L.O.Co. } p. 302

Fig. 1

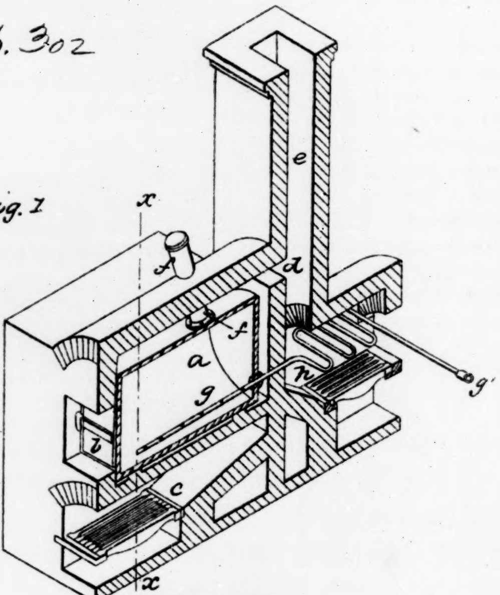
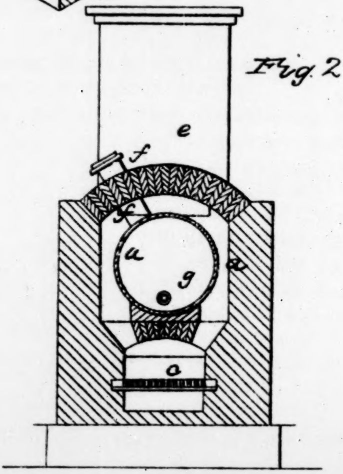


Fig. 2



produce much light oil, two or three of the tubes X may be connected with R; or if, to the contrary, the petroleum produces much heavy oil, two or three of the longer tubes X X, at the outer extremity of P, may be connected with the tank S. The product of the middle portion, being always free from the too heavy and too light portions, runs always in the middle tank, Q. The quality of each portion descending through each tube X may be tested by samples drawn off by the small cocks in the bend O. It is clear that by this my arrangement we succeed to separate by one single, very rapid, and continuous distillation any kind of petroleum or other substance in products of graduated different volatility, which, by the stop-cock in the connecting-tube P, we may at once mix, as necessary, or separate, if we choose.

What I claim as my invention is—

1. The production of a partial vacuum by suction produced in the still by a pump, either between it and the condenser, or at the end of the tube intended for the escape of the non-condensable products, which vacuum may be filled by those non-condensable products—vapor, air, or steam—led to and admitted from the other end of the apparatus, provided with a safety-valve.

2. The peculiar arrangement of the fractional condenser and its collecting and separating boxes, producing at one single operation liquids of different degrees of volatility, as above described.

3. A series of stop-cocks at different places in the still and condenser, for the purpose of admitting a current of air, or of conducting the escaping gases and vapors or steam over or through the liquid during the process of exhaustion.

P. H. VANDER WEYDE, M. D.

Witnesses:
EDMUND WILCOX.
ALONZO P. RUTHERFORD.

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301 DEFENDANT'S EXHIBIT J.

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE.

To all persons to whom these presents shall come, Greeting:

This is to certify that the annexed is a true copy from the files of this office of the specification and drawing in the matter of the letters patent granted E. N. Horner January 25, 1859, Number 22727, for improvement in oil still.

In testimony whereof I, E. M. Marble, Commissioner of Patents, have caused the seal of the Patent Office to be affixed this 30th day of June, in the year of our Lord one thousand eight hundred and eighty-three, and of the Independence of the United States the one hundred and seventh.

[L. S.] E. M. MARBLE,
Commissioner.

(Here follows diagram marked p. 302.)

303 *Specification Forming Part of Letters Patent No. 22727, Dated Jan. 25, 1859.*

To all whom it may concern:

Be it known that I, E. N. Horner, of New Brighton, in the county of Beaver and State of Pennsylvania, have invented a new and useful improvement in the process of extracting oil from coal,
304 shale, and other minerals, and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the annexed drawing, forming part of this specification, in which—

Figure 1 is a longitudinal section of the retort which I use for extracting oil.

Figure 2 is a transverse section of the retort.

My improvement consists in the use of a mixture of cream of tartar, common salt, and slaked lime in the prime condenser, whereby the oil is condensed and separated from the water and the gas, which would otherwise be apt to ignite, is rendered uninflammable, and is partly condensed, while the sulphurous vapor is separated and passes away.

To enable others skilled in the art to make use of my improved process I will proceed to describe it more minutely in detail, and in so doing I will describe the process as applied to shale, which requires thrice the time in treatment that the bituminous coal does.

The shale, coal, or other article under treatment is first broken up into small pieces and then placed in the retort *a*, figures 1 and 2, through the door *b*. The retort is cylindrical, and made of iron, and is placed over a furnace, *c*, so arranged that the heated air from the furnace passes all around the retort before escaping through the flue *d* into the chimney *e*.

This retort is filled nearly full, space being allowed for the swelling of the material during the process of distillation, and the door is then tightly closed. The vapor which passes from the shale escapes through the exit pipe *f*, whence it passes into an upright prime condenser (not shown in the drawings). This prime condenser is made of strong sheet iron, and may be about four feet high and two feet in diameter.

305 The pipe from the retort enters this prime condenser about eighteen inches from the bottom. On top of this prime condenser is a cap or covering with a bent neck, which contracts rapidly into a tube with a small orifice, through which the sulphurous vapor escapes. A small pipe opens into this prime condenser about one inch from the bottom, and thence passes to a worm in a cooler filled with cold water, by passing through which the oil is cooled. From thence it passes into a separating chamber, where the oil is separated from the water of the condensed steam and is drawn off in a finished condition.

After the shale has been exposed to the roasting process in the retort for about twenty-four hours the vapor which passes from it will be found to become somewhat yellow, having previously been white.

It is now time to subject it to the action of steam, in order fully to extract the oil from the mineral under treatment. This heated steam forces its way through the mass of roasted shale in the retort and extracts from the heated mass the oleaginous particles, carrying them off in the form of vapor. This continues for about eight or ten hours, when the whole charge becomes exhausted and the steam is cut off from the retort, which is then opened and recharged with shale.

The oleaginous vapor thus extracted by the steam passes through the tube *f* into the prime condenser before described. On the bottom of this condenser is placed a mixture of cream of tartar, common salt, and dry slaked lime. About one ounce of the cream of tartar and two pounds each of the salt and lime suffice for one charge. When the oleaginous vapor passes into the prime condenser the presence of the mixture of cream of tartar, salt, and lime causes the separation of the steam from the oil and condenses
306 the inflammable gas or extracts the oil from it and deprives
it of its inflammable quality. The fumes of sulphur, which the oleaginous vapor contained are in like manner separated, and being lighter than the condensed steam and oleaginous vapor, pass out of the top of the condenser through an orifice in its neck. The oil and water thus separated in the prime condenser flow out through a small pipe near the bottom of the condenser, and through a worm (with which that pipe connects) in the cooler, the worm and cooler being such as are ordinarily used in distilling apparatus.

After passing through the worm in the cooler the oil and water, cooled and fully condensed, pass into a separating tub; the water being, of course, of greater specific gravity, falls to the bottom, and the oil rising on top of it, is readily drawn off.

What I claim as my invention, and desire to secure by letters patent, is—

The use of a mixture of cream of tartar, common salt, and slaked lime, for the purpose of condensing the oleaginous vapor produced by the dry distillation of coal, shale, or other bituminous minerals, extracting the oil from the gas, and depriving the gas of its inflammable quality, and throwing off the sulphurous vapor in the manner hereinbefore described.

In testimony whereof I have hereunto set my hand this seventh day of June, A. D. 1856.

E. N. HORNER.

Witnesses:
W. BAKEWELL.
MARTIN G. CUSHING.

Ex'd: H. M. H., E. M. M.

307 DEFENDANT'S EXHIBIT K.

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE.

To all persons to whom these presents shall come, Greeting:

This is to certify that the annexed is a true copy from the bound volumes of this office of the specifications and drawings in the matter of the English letters patent granted William Armand Gilbee December 27, 1858, number 2958, for "improvements in treating fatty bodies and in the apparatus employed therein."

In testimony whereof I, E. M. Marble, Commissioner of Patents, have caused the seal of the Patent Office to be affixed this 30th day of June, in the year of our Lord one thousand eight hundred and eighty-three, and of the Independence of the United States the one hundred and seventh.

[L. S.] E. M. MARBLE,
Commissioner.

308 A. D. 1858, 27th December, No. 2958.

Distilling Fatty Bodies.

Letters patent to William Armand Gilbee, of No. 4 South street Finsbury, London, patent agent, for the invention of "improvements in treating fatty bodies and in the apparatus employed therein," a communication sealed the 17th June, 1859, and dated the 27th December, 1858.

Specification in pursuance of the conditions of the letters patent filed by the said William Armand Gilbee in the Great Seal Patent Office on the 24th June, 1859.

To all to whom these presents shall come I, William Armand Gilbee, of No. 4 South street, Finsbury, London, patent agent, send greeting:

Whereas her most excellent majesty, Queen Victoria, by her letters patent bearing date the twenty-seventh day of December, in the year of our Lord one thousand eight hundred and fifty-eight, in the twenty-second year of her reign, did, for herself, her heirs, and successors, give and grant unto me, the said William Armand Gilbee, her special license that I, the said William Armand Gilbee, my executors, administrators, and assigns, or such others as I, the said William Armand Gilbee, my executors, administrators, and assigns, should at any time agree with, and no others, from time to time and at all times thereafter, during the term therein expressed, should 309 and lawfully might make, use, exercise, and vend within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man an invention of "improvements in treating fatty bodies, and in the apparatus employed therein," a communication from a foreigner residing abroad, upon the condition (amongst others) that I, the said William Armand Gilbee, my executors or administrators, by an instrument in writing under my or their or one of their hands and seals, should particularly describe and ascertain the nature of the said invention and in what manner the same was to be performed, and cause the same to be filed in the Great Seal Patent Office within six calendar months next and immediately after the date of the said letters patent:

Now know ye that I, the said William Armand Gilbee, do hereby declare the nature of the said invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement, reference being had to the drawing hereto annexed and to the figures and letters marked thereon—that is to say:

The invention communicated to me consists, first, in distilling neutral fats and fat acids at a regular temperature, between six hundred and sixty degrees to six hundred and seventy-eight degrees Fahrenheit, in superheated steam.

Secondly, in the employment in the distillation of neutral fats and fat acids of an air pump working with an intermittent motion in connection with the ordinary still and refrigerator for extracting the gases of distillation from the still as soon as formed, and
310 by which (air pump) a regular temperature between six hundred and sixty degrees and six hundred and seventy-eight degrees Fahrenheit is maintained, the loss of material by the ordinary process in great part avoided, and a good product obtained.

By the ordinary process, all neutral or acid fats previously heated to a maximum temperature of seven hundred degrees Fahrenheit, and afterwards submitted to distillation with a current of divided and heated water, steam will distill and will furnish fatty acids, more or less colored. This distillation, however, is attended with the production, first, of acroleine, the vapor of which irritates to a high degree the eyes and respiratory organs of the workmen; secondly, of carburetted hydrogen, the formation of which causes a considerable loss of raw material. The production of acroleine and formation of carburetted hydrogen will increase if the temperature be raised to seven hundred and twenty-one degrees Fahrenheit and above, and also if the disengaged gases or vapors are kept a long time exposed to this temperature; therefore, as this increase of temperature always takes place in practice by the means known and in practice, this process is very imperfect.

Long and repeated experiments have led to the discovery that these defects might be removed if the temperature in the still were maintained at between six hundred and sixty degrees to six hundred and seventy-eight degrees Fahrenheit, and if at the same time the gases formed in the still were rapidly removed. I have attained this object by means of an intermittent vacuum, in which I
311 maintain the temperature of the matters to be distilled and that of the overheated steam between six hundred and sixty degrees and six hundred and seventy-eight degrees Fahrenheit by a regular discharge of the distilled gases as soon as formed by means of the air pump, the action of which should be regulated according to the quantity of gas produced.

The inspection of the thermometer and the nature of the substances run off allow of the ascertaining and regulating of the intermittent motion of the pump, and which is effected by means of a series of pulleys of a conical form, or by other suitable mechanical means. In this way I avoid the carrying over of the fatty bodies, which might result from a complete vacuum arising from an excess, and more especially from the continuity of the exhaustion. The intermittent action of the pump prevents the vapors from remaining stationary in the vacant part of the still and from becoming overheated, and thus the equilibrium of temperature between the fatty bodies and the vapors is obtained.

Description of the Drawing.

A, furnace with two compartments, each provided with a fireplace and ash box; in the first compartment is a worm composed of a double row of iron pipes, *a a*, arranged between two vaults; in the second compartment is placed the still B, with its appliances; *a a a a*, worm for superheating the water, vapor, or steam necessary for the distillation, the water being supplied from a steam boiler placed
as close as possible to the furnace A; *b*, pipe with a cock for
312 the introduction of the steam from the boiler into the worm
a a a a; C, a pyrometer for indicating the temperature of the furnace in the first compartment, and also the temperature of the superheated steam when it enters the still; *d*, pipe provided with a tap for conveying the superheated steam from the worm *a a* into the still B; this pipe descends obliquely into the still, and has at its lower extremity a rose or head, which is serrated at the edges for the purpose of dividing the water steam, this rose resting on the bottom of the still or apparatus; *e*, thermometer for indicating the degree of heat of the fatty matters in the still, and heated by means of the furnace in the second compartment; *f*, gauge for indicating and regulating the action of the air pump; *g*, pipe having a double branch or top, each branch being provided with a tap. The lower end of the pipe *g* extends nearly to the bottom of the apparatus.

The liquid fatty bodies are caused to enter through one of the branches when it is desired to charge the apparatus, the other branch being for the purpose of drawing off the tar produced at each operation, which it is necessary to do before recommencing; *g g*, valve for shutting off communication between the still and the refrigerator when the tar is being drawn off; C, large tub or vat, serving as a refrigerator; this tub, which should always be filled with water, contains a metallic worm communicating with the still, and which is for the purpose of condensing the products of distillation drawn up by the air pump; D, air pump for extracting the gas, which
is in communication with the lower part of the worm of the
313 refrigerator, the action of which is intermittent and should
not produce more than about half a vacuum, and it may receive its motion from any suitable prime mover in connection with conical pulleys or other suitable mechanism for regulating its motion, by which the egress of the gases of distillation may be re-

tarded or expedited; *i*, receiver of the air pump, and in which the extracted and condensed gases enter, holding in suspension the water of the condensed steam; *j*, a double box lined with lead, communicating with the receiver *i*, and in which the condensed products collect; at the lower part of the box is a cock to let off the water at the same time as the fat acids are running off through the pipe *k k* into the vat or tub E; this box is furnished with a wooden chimney or funnel at top, through which the acroleine escapes; *e*, large vat or tub in which the fatty acids freed from their condensed water are collected, and in which the fat acids are subjected to the first acid washing. This vat is provided with a cover made in two parts, one of which is fixed and the other movable; the movable part serves for emptying and cleaning the vat, and the fixed part communicates by means of a wooden conducting pipe with a ventilator, F, which expels the acroleine remaining in the fat acids disengaged by ebullition during the washing process.

Mode of Operating.

The still B is two-thirds filled with neutral fats or fat acids first reduced to a fluid state and freed from foreign bodies by washing or filtration. I light the two fires of the furnace A and wait till
314 the pyrometer marks six hundred and sixty degrees to six
hundred and seventy-eight degrees Fahrenheit in the compartment containing the worm *a a a a*, and also until the thermometer placed in the still marks four hundred and sixty degrees to four hundred and eighty-seven degrees Fahrenheit, at which temperature the neutral fats are near to distillation; I then introduce superheated steam into the still and at the same time set the air pump in action. The distilling operation then commences and the pump will draw off the gases as soon as they are formed, it being merely necessary to take care that the two temperatures should equilibrate so that the vapor should not exceed six hundred and sixty degrees to six hundred and seventy-eight degrees Fahrenheit.

And having now described the nature of the said invention and the manner of performing the same, I wish it to be understood that I do not claim as of the invention communicated to me the apparatus herein described and shown in the accompanying drawing, but what I claim as new as of the invention is—

First. The distilling neutral fats and fat acids at a temperature between six hundred and sixty degrees and six hundred and seventy-eight degrees Fahrenheit, as hereinbefore described.

Secondly. The employment in connection with an ordinary still and refrigerator for distilling neutral fats and fat acids of an air pump with an intermittent action for carrying off the gases
315 of distillation from the still as soon as formed, and whereby a
regular temperature of between six hundred and sixty degrees and six hundred and seventy-eight degrees is maintained, as hereinbefore described and referred to in the accompanying drawing.

In witness whereof I, the said William Armand Gilbee, have hereunto set my hand and seal this twenty-first day of June, one thousand eight hundred and fifty-nine.

W. A. GILBEE. [L. S.]

(Here follows diagrams marked pp. 316 & 317.)

318

UNITED STATES PATENT OFFICE.

JAMES J. JOHNSTON, of Allegheny City, Pennsylvania.

Improved Apparatus for Distilling Oil.

Specification forming part of Letters Patent No. 48285, dated June 20, 1865.

To all whom it may concern:

Be it known that I, James J. Johnston, of the city and county of Allegheny, in the State of Pennsylvania, have invented a new and useful improvement in apparatus and process for distilling oil, &c.; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawing, and to the letters of reference marked thereon.

The nature of my invention consists in exhausting air from the still, condenser, and receiving-vessel, so that the distilling process may be carried on under a partial vacuum, said still and its furnace and the condenser and receiving-vessel being constructed, arranged, and combined substantially in the manner hereinafter described.

In the accompanying drawing, 10 represents the pedestals or piers upon which the various parts of the apparatus rest. These pedestals or piers may consist of brick or stone work, and they should correspond in form and size to the part of the apparatus resting on them.

In the drawing, *a* represents a vessel for holding crude coal-oil or petroleum. This vessel *a* is connected, by means of a pipe marked *o*, to the lower part of the furnace *b*, which is marked *c*, which I will call the "fire-chamber."

The furnace *b* and its fire-chamber *c* are made of heavy sheet-iron, and may be lined with brick (all above chamber *c*) if so desired.

The fire-chamber *c* of the furnace *b* should be made water or oil tight, and substantially in the form represented in the accompanying drawing.

f represents an air-flue, which is placed in the center of the fire-chamber *c*. This air-flue *f* is furnished with a crown or hollow disk (marked *g*), on the under side and near the outer edge of which are placed a number of small holes for the purpose of distributing the air which passes up through the flue *f*.

e represents a narrow air-flue, which surrounds the coniformed top A of the fire-chamber.

6 represents clay or brick work, which fills up the cavity between the wall of the furnace *b* and the coniformed arch-plate B used in forming the air-flue *e*.

j represents the stack or chimney of the furnace *b*.

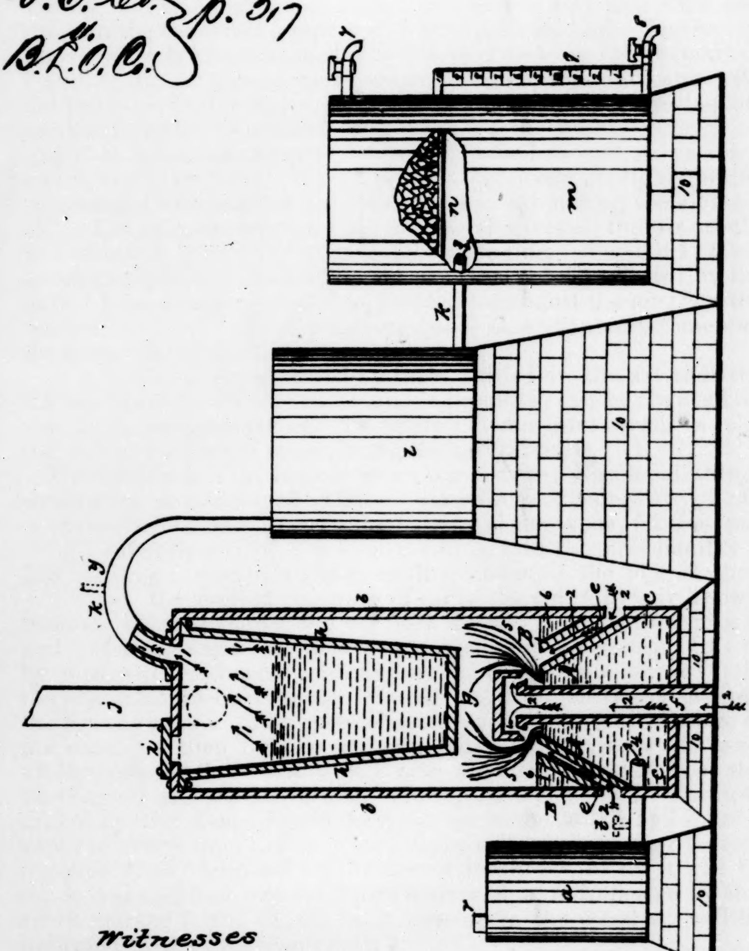
DEFENDANT'S EXHIBIT L.

J. J. JOHNSTON.

Apparatus for Distilling Oil.

No. 48,285. Patented June 20, 1865.

No. 241
V.O. Co.
vs.
B.L.O.C. } p. 317



Witnesses
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Alexander Hays

Inventor
James J. Johnston

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h represents the still, which is furnished with an ordinary manhole, which is covered with a cap marked *i*. The still is also furnished with an ordinary condensing-pipe (marked *k*) which passes through water in the vessel *l* and enters the receiving-vessel *m* just above the pipe *k*. In the receiving vessel is placed a rack, *n*, consisting of a series of bars which extend across the whole diameter of the vessel *m*. Upon this rack *n* is placed common wood charcoal in lumps or pieces about the size of American walnuts. The depth of this body of charcoal should be about two feet, and is used for absorbing the fixed or uncondensed gas which may pass over and through the condensing-pipe *k* with the condensed oil. The receiving-vessel *m* is also furnished with two stop cocks or valves (marked 7 and 8), and a glass tube (marked *x*) which communicates with the interior of the vessel *m*. This tube *x* is secured to a scale-plate marked 9, which is secured to the side of the receiving-vessel *m*. The still *h*, condensing-pipe *k*, receiving-vessel *m* and its valves 7 and 8, and glass tube *x* should be made perfectly air-tight, and be so arranged with relation to each other that, exhausting the air from either the still, condensing-pipe, or receiving-vessel, the air would be exhausted from all of them at the same time. Thus, if I attach an air-pump to the condensing-pipe *k* at the point indicated by the dotted lines marked *y*, I will be enabled to exhaust the air from the condensing-pipe *k*, still *h*, receiving-vessel *m*, and tube *x* at one and the same operation.

It will readily be observed by those skilled in the art that the various parts herein described and represented can be changed in size, form, and proportions. Therefore I do not limit myself in relation to the manner of constructing the several parts.

The operation of my improvement is as follows: Having all things constructed and arranged as herein described and represented, I put crude coal-oil or petroleum in the vessel *a* at the tube *r*. I then put water, by any of the known means, into the fire-chamber *c*, 319 filling it within an inch, or thereabout, of the top. I then put the desired quantity of oil in the still *h* by any known means. I then exhaust the air from the still *h*, condensing-pipe *k*, and receiving-vessel *m* by means of a suitable air-pump. I then, by means of a valve (as indicated by the dotted lines marked *t*) in the pipe *o*, admit by a regular flow the desired quantity of oil into the fire-chamber *c*. The oil thus admitted will rise to the surface of the water. I then light or set fire to this oil, and the air will pass up through the flue *e* and *f*, mix with the flame (marked 5) of the burning oil, and the combustion be complete and perfect. The heat caused by the flame 5 will heat the oil in the still *h* and cause a vapor to evolve from the oil, which vapor will pass into the condensing-pipe *k*, as indicated by the arrows marked 1, where it will be condensed and flow into the receiving-vessel *m*, as indicated by the arrow marked 3, and the oil, as it rises up in the vessel *m*, will be indicated by the tube *x* and scale 9.

The arrows marked 2 represent the course of the air through flues *e* and *f* to the flame 5.

When I desire to draw off any part of the oil which has been distilled—as benzole—I open the valve 7 to admit air into the vessel *m*. I then open the valve 8 and draw off what is desired. I then close the valves 7 and 8 and again exhaust the air, as described, and again proceed with the distillation.

The advantages of my improvement are as follows: It is a well-understood fact that the boiling or evolving point of all liquids depends on their density and the amount of atmospheric pressure bearing on them—that is to say, a light liquid under a light atmosphere will boil or evolve with less heat than will a heavy oil or liquid under a heavy atmosphere; and it is also a well-understood fact that all burning oils which are distilled by a low degree of heat are better in quality and appearance than oils which are distilled by a high degree of heat. Now, by the use of my improvement and apparatus, I am enabled to distill oil or other liquids with a very low degree of heat by carrying on the distilling process under a partial vacuum, as herein described, and I thereby make a better burning oil, with less expense of fuel and less of the chemicals used for bleaching and for deodorizing the oil, for it is well known that the greater the heat used in distilling oil the greater must be the quantity used of fuel and chemicals.

Another very great advantage gained by my improvement is safety from the dangers of fire in the distilling process, for there can be no escaped gas flying about in the distilling and receiving rooms nor any exposure of distilled oil to the lights of lamps or sparks of fire.

Having thus described the nature, construction, operation, and advantages of my improvement, what I claim as of my invention is—

1. Distilling oil or other liquids by means of a still, condenser, and receiving-vessel from which oil is exhausted, so that the distilling process is carried on under a partial vacuum, substantially as herein described and set forth.

2. The arrangement of the vessel *a*, furnace *b*, condenser *k*, vessel *l*, and receiving-vessel *m*, furnished with tube *x*, scale 9, valves 7 and 8, and rack *n*, the whole being constructed, arranged, and operating substantially in the manner herein described and for the purpose set forth.

JAMES J. JOHNSTON.

Witnesses:
C. Z. EDDY.
JAMES O. FANING.

320 DEFENDANT'S EXHIBIT M.

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE.

To all persons to whom these presents shall come, Greeting:

This is to certify that the annexed is a true copy from the bound volumes of this office of the specification and drawing in the matter of the English letters patent granted Charles Constant

Boutigny December 18, 1852, number 1105, for "improvements in distillation and in the apparatus employed therein."

In testimony whereof I, E. M. Marble, Commissioner of Patents, have caused the seal of the Patent Office to be affixed this 30th day of June, in the year of our Lord one thousand eight hundred and eighty-three, and of the Independence of the United States the one hundred and seventh.

[L. S.] E. M. MARBLE,
Commissioner.

321 A. D. 1852. No. 1105.

Distillation.

Letters patent to Charles Constant Boutigny, of Evreux, in the Empire of France, for the invention of "improvements in distillation and in the apparatus employed therein." Sealed the 4th May, 1853, and dated the 18th December, 1852.

Specification in pursuance of the conditions of the letters patent filed by the said Charles Constant Boutigny in the great seal patent office on the 18th June, 1853.

To all to whom these presents shall come I, Charles Constant Boutigny, of Evereux, in the Empire of France, send greeting:

Whereas her most excellent majesty, Queen Victoria, by her letters patent bearing date the eighteenth day of December, in the year of our Lord one thousand eight hundred and fifty-two, in the sixteenth year of her reign, did for herself, her heirs and successors, give and grant unto me, the said Charles Constant Boutigny, her special license that I, said Charles Constant Boutigny, my executors, administrators, and assigns, or such others as I, the said Charles Constant Boutigny, my executors, administrators, and assigns, should at any time agree with and no others from time to time and at all times thereafter during the term therein expressed, should and lawfully might make, use, exercise, and vend within the United Kingdom of Great Britain and Ireland, the Channel Islands, and 322 Isle of Man an invention for "improvements in distillation and in the apparatus employed therein" upon the condition (amongst others) that I, the said Charles Constant Boutigny, by an instrument in writing under my hand and seal, should particularly describe and ascertain the nature of the said invention, and in what manner the same was to be performed, and cause the same to be filed in the great seal patent office within six calendar months next and immediately after the date of the said letters patent:

Now, know ye that I, the said Charles Constant Boutigny, do hereby declare the nature of my said invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement—that is to say:

My invention consists in distilling all matters susceptible of distillation by means of apparatus, wherein the vapours arising from the matters under distillation become condensed as rapidly as they are formed, or nearly so as may be, and wherein little or no portion of such vapours can fall into or become mixed with such matters; and in order to guard against any of the matters under distillation boiling up and becoming mixed with the vapours I place a grating or layer of wire gauze, a perforated plate, or other such like intercepting medium in one or more layers above such matters, which, while intercepting them, allow free passage to the vapours which may arise therefrom.

For the distillation of wines and other spirituous liquids I combine several of the apparatuses, to be hereinafter described, in
323 a series in such manner that the product distilled from the
first apparatus shall serve to feed the second, and so on in succession, the last apparatus in the series leading into a refrigerating coil or other description of refrigerator. I thus obtain liquids of different and varying relative densities in each apparatus, but of uniform density in each apparatus taken separately and by itself.

The liquid to be distilled forms the refrigerating liquid in passing from the condenser of the last apparatus—that is to say, from that in which the liquid is the most to that which is the least rarified, and so on in succession until it reaches the first generator, which it supplies, and the condensed vapours of which feed alternately the others in the series.

In distilling, however important it is to present a large evaporating surface to the fire, it is equally important to condense the vapours formed as rapidly as possible, bearing in mind that the vapour of water at 212° Fahrenheit at the pressure of one atmosphere fills a space about one thousand seven hundred times greater than that produced from water at 320°. By my apparatus and process extended heating surface and rapid condensation are obtained.

My evaporator may be heated by the direct action of fire, by steam, or gas at any required pressure and temperature or by any other source of heat.

Fig. 1 of the drawings hereunto annexed is a sectional elevation of an apparatus suitable for the distillation of spirituous liquors, and, if necessary, for the rectification of the product by the addition
of a second and similar apparatus. A A A is a metal boiler or
324 cucurbit, which I denominate a generator; B B B, refrigera-
tor, which I call a condenser, filled with cold liquid and hermetically closed; upon the under surface of this refrigerator the vapors arising from the generator A A A become condensed. C C C, funnel-shaped vessel, the upper edge of which is above the level of the liquid in the generator; I call this vessel a receiver, as it receives the vapors condensed by the under surface of the condenser. D is a cock for emptying the generator. E E, pipe leading from the bottom of the receiver, for carrying off the condensed vapors. F F, feed-pipe, for keeping up a constant supply; this pipe opens into the branch I I, closed at top and open at bottom. The pipe E E, which receives the distilled liquid from the first apparatus, becomes a feed-pipe to second apparatus, precisely similar to that shown at figure 1, but which it has not been considered necessary to represent, and opens into the branch similar to that shown at I I. J, in-

dicator tube, showing the level of the body under distillation. L L, flues of the furnace, for the passage of flame, smoke, and heat. M, supply-pipe, leading from a reservoir into the refrigerator. O′ O′, regulating cocks. U U, perforated diaphragm, or layer of wire gauze, for preventing the liquid during ebulition passing over with the vapors into the receiver.

Figure 2 is a sectional elevation of a modification of the apparatus hereinbefore described, particularly applicable to the distillation of fatty matters. Experiments have shown that the distillation of these bodies takes place in a direct ratio to the quantity of steam
325 injected into them. By means of the present apparatus I am enabled to inject steam in as great quantities as may be desired, with the certainty of its mixing with the fatty bodies which it reduces to the particular molecular state assumed by acids obtained by distillation. A A is the generator, the under surface of which is in the shape of the bottom of a bottle; B B B, condenser supplied with tepid water, and on the under surface of which the fatty vapours become condensed; C C C, receiver, into which the condensed vapours fall, and from which they are conducted by the pipe D D D into a refrigerating coil or other suitable refrigerator, where they are finally condensed. E E is an annular copper pipe, perforated for the escape of steam supplied through the branch pipes F F. G G is another perforated annular pipe, through which the fatty matters are forced by a pump or other suitable means connected with the supply-pipes H H, and whereby they are thrown down upon dividing substances in the bottom of the alembic. J J, jacket for containing sand for maintaining a regular heat to the generator; L L, flues; M, furnace; N, water supply-pipe; O, overflow pipe. The apparatus may be modified by fixing on the condenser a "head," as in a common still, which may be made to communicate with a refrigerating apparatus, whereby fatty acids and spirituous liquids may be distilled in one and the same apparatus. The spirituous liquids acting as condensing liquid and rising at the same time to a degree of temperature necessary for their distillation, it is of course requisite in such cases to act on bodies which boil at different temperatures.

326 And having now described the nature of my said invention, and in what manner the same is to be performed, I declare that I claim—

First. The distillation of all matters capable of being distilled by means of apparatus wherein the vapours arising from such matters are condensed and carried off as rapidly as they are formed, or as nearly so as may be; and,

Second. I claim the particular arrangement and combination of the parts A, B, and C, shown in the drawings hereunto annexed and before described, for the distillation of all matters capable of being distilled.

In witness whereof I, the said Charles Constant Boutigny, have are formed, or nearly so as may be, and wherein little or no portion of such vapours can fall into or become mixed with such matters; and in order to guard against any of the matters under distillation boiling up and becoming mixed with the vapours I place a grating or layer of wire gauze, a perforated plate, or other such like intercepting medium in one or more layers above such matters, which, while intercepting them, allow free passage to the vapours which may arise therefrom.

For the distillation of wines and other spirituous liquids I combine several of the apparatuses, to be hereinafter described, in
323 a series in such manner that the product distilled from the
first apparatus shall serve to feed the second, and so on in succession, the last apparatus in the series leading into a refrigerating coil or other description of refrigerator. I thus obtain liquids of different and varying relative densities in each apparatus, but of uniform density in each apparatus taken separately and by itself.

The liquid to be distilled forms the refrigerating liquid in passing from the condenser of the last apparatus—that is to say, from that in which the liquid is the most to that which is the least rarified, and so on in succession until it reaches the first generator, which it supplies, and the condensed vapours of which feed alternately the others in the series.

In distilling, however important it is to present a large evaporating surface to the fire, it is equally important to condense the vapours formed as rapidly as possible, bearing in mind that the vapour of water at 212° Fahrenheit at the pressure of one atmosphere fills a space about one thousand seven hundred times greater than that produced from water at 320°. By my apparatus and process extended heating surface and rapid condensation are obtained.

My evaporator may be heated by the direct action of fire, by steam, or gas at any required pressure and temperature or by any other source of heat.

Fig. 1 of the drawings hereunto annexed is a sectional elevation of an apparatus suitable for the distillation of spirituous liquors, and, if necessary, for the rectification of the product by the addition of a second and similar apparatus. A A A is a metal boiler or
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tor, which I call a condenser, filled with cold liquid and hermetically closed; upon the under surface of this refrigerator the vapors arising from the generator A A A become condensed. C C C, funnel-shaped vessel, the upper edge of which is above the level of the liquid in the generator; I call this vessel a receiver, as it receives the vapors condensed by the under surface of the condenser. D is a cock for emptying the generator. E E, pipe leading from the bottom of the receiver, for carrying off the condensed vapors. F F, feed-pipe, for keeping up a constant supply; this pipe opens into the branch I I, closed at top and open at bottom. The pipe E E, which receives the distilled liquid from the first apparatus, becomes a feed-pipe to second apparatus, precisely similar to that shown at figure 1, but which it has not been considered necessary to represent, and opens into the branch similar to that shown at I I. J, in-

dicator tube, showing the level of the body under distillation. L L, flues of the furnace, for the passage of flame, smoke, and heat. M, supply-pipe, leading from a reservoir into the refrigerator. O′ O′, regulating cocks. U U, perforated diaphragm, or layer of wire gauze, for preventing the liquid during ebulition passing over with the vapors into the receiver.

Figure 2 is a sectional elevation of a modification of the apparatus hereinbefore described, particularly applicable to the distillation of fatty matters. Experiments have shown that the distillation of these bodies takes place in a direct ratio to the quantity of steam in-
325 jected into them. By means of the present apparatus I am enabled to inject steam in as great quantities as may be desired, with the certainty of its mixing with the fatty bodies which it reduces to the particular molecular state assumed by acids obtained by distillation. A A is the generator, the under surface of which is in the shape of the bottom of a bottle; B B B, condenser supplied with tepid water, and on the under surface of which the fatty vapours become condensed; C C C, receiver, into which the condensed vapours fall, and from which they are conducted by the pipe D D D into a refrigerating coil or other suitable refrigerator, where they are finally condensed. E E is an annular copper pipe, perforated for the escape of steam supplied through the branch pipes F F. G G is another perforated annular pipe, through which the fatty matters are forced by a pump or other suitable means connected with the supply-pipes H H, and whereby they are thrown down upon dividing substances in the bottom of the alembic. J J, jacket for containing sand for maintaining a regular heat to the generator; L L, flues; M, furnace; N, water supply-pipe; O, overflow pipe. The apparatus may be modified by fixing on the condenser a "head," as in a common still, which may be made to communicate with a refrigerating apparatus, whereby fatty acids and spirituous liquids may be distilled in one and the same apparatus. The spirituous liquids acting as condensing liquid and rising at the same time to a degree of temperature necessary for their distillation, it is of course requisite in such cases to act on bodies which boil at different temperatures.

326 And having now described the nature of my said invention, and in what manner the same is to be performed, I declare that I claim—

First. The distillation of all matters capable of being distilled by means of apparatus wherein the vapours arising from such matters are condensed and carried off as rapidly as they are formed, or as nearly so as may be; and,

Second. I claim the particular arrangement and combination of the parts A, B, and C, shown in the drawings hereunto annexed and before described, for the distillation of all matters capable of being distilled.

In witness whereof I, the said Charles Constant Boutigny, have hereunto set my hand and seal this twenty-eighth day of May, one thousand eight hundred and fifty-three.

[SEAL.] BOUTIGNY (D'Evreux) FILS.

(Here follow diagrams marked pp. 327 & 328.)

329

UNITED STATES PATENT OFFICE.

ADOLPH MILLOCHAU, of New York, N. Y.

Improvement in Distillation of Petroleum.

Specification forming part of Letters Patent No. 53167, dated March 13, 1866.

To all whom it may concern:

Be it known that I, Adolph Millochau, of the city and State of New York, have invented, made, and applied to use a certain new and useful improvement in the distillation of petroleum and similar oils; and I do hereby declare the following to be a full, clear, and exact description of the said invention, reference being had to the annexed drawings, making part of this specification, wherein—

Figure 1 is a plan of the apparatus employed by me, and Fig 2 is a vertical section of the same.

Similar marks of reference denote the same parts.

In letters patent granted to me March 21, 1865, a mode of distilling petroleum is set forth. The present invention relates to a mode of distillation in which a similar still to that shown in said letters patents is employed; but by my present invention the benzine and easily-evaporated materials are distilled from the crude oil previous to its introduction into the still by the heat evolved in the condensation of the heavier or burning oils.

In the drawings, *a* is a fire-chamber, in which is placed the still *b* and inner or second still, *c*, as in aforesaid patent.

d is a pipe from the still *b*, extending as a worm or condenser through the vat *e* to the delivery-neck *f*, and *g* is a pipe from the still *c* through the vat *e*, terminating at the delivery-neck *h*. 1 and 2 are upright vents for the gases that will not condense in *d* and *g*.

The vessel *e* is covered, and is to contain crude oil, and *i* is a pipe passing through a tub or condenser, *l*, to the neck *k*. *m* is a pipe under *k*, leading back into the vessel *e*.

n is a pipe leading to the bottom or lower part of the still *b* and *o* a similar pipe to the still *e*.

The vessel *e* should be of a capacity to hold considerable more than the charge to the still *b*, and a charge of crude oil is introduced in the still *b*, and the vessel *e* also filled. The fire is started, the vapors pass over from *b* through *d*, and are condensed by *e*, and returned through the pipe or neck *f* and a movable trough (see dotted lines, Fig. 2) and the pipe *n* to the still *b*. This is done until the benzine and easily-evaporated materials are distilled, or these may be conveyed away to a receptacle until oil of the required gravity is

DEFENDANT'S EXHIBIT N.

~~C.B.H. SPL. EXR~~

A. MILLOCHAU.

Distillation of Petroleum.

No. 53,167. Patented March 13, 1866.

No. 241
V.O. Co.
v
B.L.O. Co.
p. 328

Fig: 2.

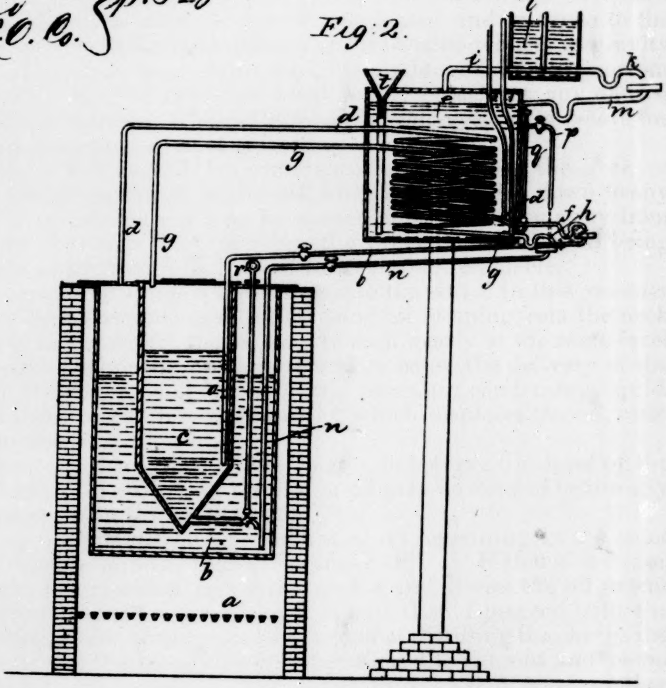
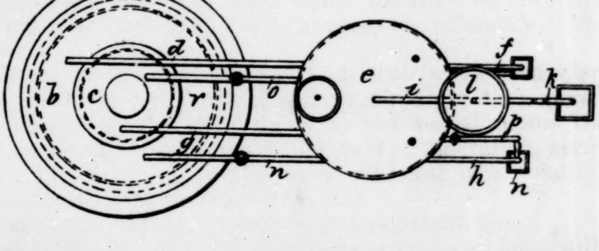


Fig: 1.



Witnesses.
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Geo. D. Walker

Inventor
A. Millochau

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distilled, which is allowed to run into the inner still, *c*, through the pipe *o*, and thence vaporized by the heat of the still *b*, and the vapors condensed by *e*, and the product returned by pipe *n* into still *b* until a burning oil of the proper gravity is distilled, which is taken away to a suitable receptacle, the same as in aforesaid letters patent.

During the foregoing operations the crude oil in the vessel *e* has become heated by the condensation of the vapors in the coils *d* and *g*, and the benzine and other easily-evaporated materials have been passing off by the pipe *i* and been condensed and returned to the vessel *e*, which repeated distillation of the benzine reduces its gravity so that it becomes less volatile, and the product of distillation from this vessel *e* may be conveyed away to a receptacle at any desired stage of the process. It must, however, be conveyed away before the commencement of the next operation.

After the burning oil has commenced to run from the neck or pipe *h*, and when the oil in the still *b* has been distilled down to any desired level, the cock *p* is to be opened and the oil run away from the vessel *e* through the pipe *n* into the still *b*, the burning oil being conveyed away from *h* by a spout to a suitable receptacle.

The amount of crude oil running into the still *b* in this manner is to be about the same as of the burning oil escaping from the neck or pipe *g*, in order that the oil may remain nearly at the same level in the stills during the operations, and to cause the delivery of the oil from the vessel *e* and maintain the necessary condensing-liquid. I cause water to run into the funnel *t*, which displaces the oil, causing it to rise.

A glass gage may be provided, as at *q*, to observe the level of the oil and water, in order that the exit of oil may be stopped before any water passes with it into the still.

During the distillation the amount of oil remaining in the outer still, *b*, may be too little to heat the inner still, *c*. If that is the case, I turn the key *r*, which opens the cock *s* and allows the oil to run from the still *c* into the still *b*, and then I proceed with the
330 distillation, as before; or at the end of distilling the charge the oil from the inner still may be allowed to run out and be redistilled with the crude oil introduced into the still *b* for another charge.

I make use of a conical bottom to the still *c*, as represented, in order that the lower end may come down toward the lower and hotter portions of the still *b*, and thus increase the efficiency of said still *c*.

By the various distillations aforesaid but little waste occurs, and the percentage of burning oil obtained is much larger than heretofore, and the evaporation of the benzine by the heated vapors that pass off and are condensed facilitates the general operation, saving time and fuel, and resulting in the crude oil being in a condition for immediate distillation in the double still.

What I claim, and desire to secure by letters patent, is—

1. The method herein specified of preparing crude oil for distillation by evaporating the benzine and other volatile substances by a

coil of pipe containing heated vapors and returning the condensed benzine into the crude oil, as specified.

2. Supplying the crude or partially-crude petroleum in a heated state from a vessel, *e*, containing the same, to the outer still, *b*, and passing the condensed products of the still *b* back into the inner still, *c*, for the purposes and substantially as specified.

3. The cock *s* or its equivalent, in combination with the stills *b* and *c*, for the purposes set forth.

4. The vessel *e* for containing crude oil, in combination with the stills *b* and *c* and condensing-pipes *d* and *g*, for the purposes and as set forth.

5. The conical bottom to the inner still, applied as and for the purposes set forth.

In witness whereof I have hereunto set my signature this 7th day of October, A. D. 1865.

AD. MILLOCHAU.

Witnesses:
LEMUEL W. SERRELL.
GEO. D. WALKER.

(Here follows diagram marked p. 331.)

332

United States Patent Office.

Orazio Lugo, of New York, N. Y.

Improvement in Apparatus for Distilling Petroleum, &c.

Specification forming part of Letters Patent No. 58113, dated September 18, 1866.

To all whom it may concern:

Be it known that I, Orazio Lugo, of the city, county, and State of New York, have invented certain new and useful improvements in the process of distilling petroleum and other oils; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is an elevation, mainly in section, of a distilling apparatus, illustrating my invention. Fig. 2 is a plan of the same.

Similar letters of reference indicate corresponding parts in both figures.

This invention relates to the introduction of atmospheric air or other gaseous substances during the distilling process among the vapors eliminated from petroleum or other oils by the heat applied to the still, for the purpose of expediting the distilling process and improving the quality of the distilled oils.

In my letters patent dated January 2, 1866, I have described the admission of air into the still. Subsequent experiments have, however, led to the discovery that after the vapors of the lighter oils have passed over from the still and the temperature of the still is

DEFENDANT'S EXHIBIT O

~~S. B. U. [illegible] EXR.~~

O. LUGO.

Oil Still.

No. 58,113. No. 241 V.O.Co v B.L.O.Co } p. 331 **Patented Sept. 18, 1866.**

Fig: 1.

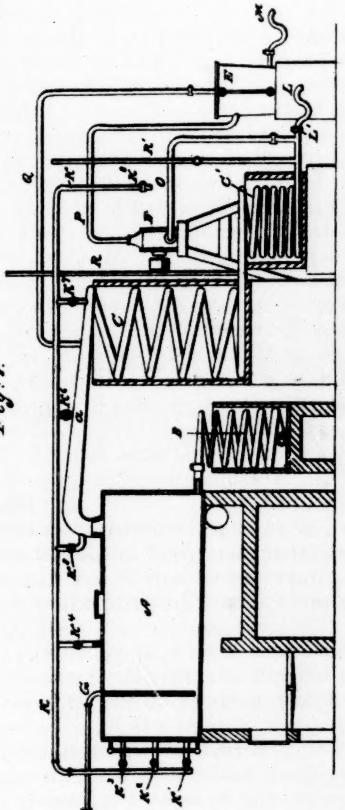
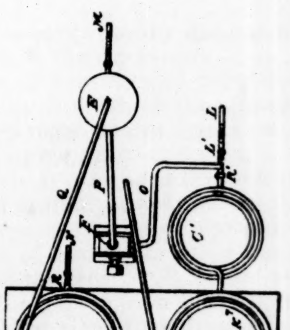


Fig: 2.



Witnesses:
Jno Coombly.
A LeClerc

Inventor:
Orazio Lugo

c
t
i

a
e
h

raised to evolve the vapors of heavier oils, it is desirable to introduce the air or gas into the goose-neck or exit-pipe of the still, in order that it may not become, by passing too great a distance in contact with the hot vapors, so highly heated as to combine with the hydrocarbon vapors in such manner as to generate or form ammoniacal gases, and the point of admission of the air or gas requires to be varied as the increase of temperature is continued in order to shorten the distance between such point and the condensing apparatus.

This invention therefore consists in the admission of the air into the goose-neck or exit-pipe of the still, and in varying the point of admission to the still and goose-neck or exit-pipe as the distilling process progresses.

To enable others skilled in the art to carry out my invention, I will proceed to describe it with reference to the drawings.

A is the still, which, for the purpose of varying and regulating the distance from the condensing apparatus at which the air is admitted, I prefer to make of horizontally elongated form. It is heated by a furnace below, and filled through a pipe, G.

a is the goose-neck or exit-pipe, which is continued through the cooling-tanks of two condensers, C C′, of ordinary construction. Beyond the second condenser, C′, the pipe is continued upward, as shown at O, to the induction-opening of a rotary or other pump, F, the eduction-pipe F of which leads to the receiver E for the condensed products. The pump F draws the vapors from the still and the oil from the condensers C C′, and at the same time draws air or gas into and through the still or exit-pipe through a pipe K, at the inlet end of which there is a stop-cock, K^7, to shut off or regulate the supply. The said pipe K is connected with the end of the still farthest from the exit-pipe *a* at different heights by means of stop-cocks K′ K^2 K^3; also with the top of the still by a stop-cock, K^4, and with the exit-pipe *a* by stop-cocks K^5 and K^6 at different distances from the still.

From the reservoir E a pipe, Q, leads to a third condenser, D, to convey thereinto such condensable volatile products as may arrive in the receiver E and be not condensed therein, and this pipe is continued in the form of a coil through the said condenser, with an exit at N for the condensed volatile liquid substances.

M is an exit-pipe for the distilled oil from the receiver E. R is an exit-pipe for the uncondensable vapors or gases from the third condenser D, and R′ is an exit-pipe leading from a trap in the exit-pipe outside of the second condenser, C′, for the escape of gas or light vapors when the distilling process is conducted in the ordinary manner with the pump and air-pipe K shut off, as may be temporarily necessary in case of the pump being out of order, or for any other cause. L is the exit for the oil from the still when the pump is not in operation and the air is shut off, furnished with a stop-cock, L′ which is closed when the pump is in operation and air is admitted among the vapors. Other stop-cocks, not necessary to mention, but the necessity of which will suggest itself to the practical distiller, may be used in the various pipes.

I will now describe the operation as I have practically conducted it on a large scale.

333 The still is filled to within about three inches from the stop-cock K^3, the fire applied, and as soon as the distillation commences the stop-cock L′ is closed, and communication of the exit-pipe with the pump F and the cock K^7 are opened, and the pump is set in motion; and at the same time the stop-cock K^3 is opened to admit air into the still—first, for the purpose of creating a current in connection with the pump F to counterbalance the diminishing pressure of the gases inside of the still, which, if not counterbalanced, would force the formation of vapors of such a degree as to carry them undistilled into the condensers.

The temperature of the vapors may be supposed at this stage of the distillation to be about 150°, and the gravity of the product about 80°. Stop-cock K^3 may be kept open until the gravity of the product has fallen to about 70°, by which time, the temperature having increased, I open the stop-cock K^4, shutting K^3, in order to shorten the distance which the admitted air will have to travel before reaching the condensers, for if K^3 had remained open and K^4 remained shut the distillation must have stopped, or nearly so, on account of the air getting overheated and combining with the hydrocarbon vapors, thus generating ammoniacal gases.

I keep open K^4 until the gravity of the distilled products falls to about 62°, when, the heat having again increased with the gravity of the oil, it again becomes necessary to shorten the distance which the air has to travel in order to prevent its becoming overheated, and giving rise again to the formation of ammoniacal gases; and proceeding on this principle I open K^5 until the gravity falls to 55°; then, for the reasons already given, I open K^6, either alone or with K^5, until the gravity of the product falls to about 49°; then I open K^7, shut all the other stop-cocks but K^8, and keep K^7 open until nothing remains but the tar, which is then run off from the bottom of the still into the condenser B.

What I claim as my invention, and desire to secure by letters patent, is—

1. The admission of air or gas into the goose-neck or exit-pipe of the still, substantially as and for the purpose herein specified.
2. Varying the point of admission of the air or gas B into the still and goose-neck or exit-pipe as the process of distillation progresses, substantially as and for the purpose herein set forth.

ORAZIO LUGO.

Witnesses:
HENRY T. BROWN.
A. Le CLERC.

(Here follows diagram marked p. 334.)

DEFENDANT'S EXHIBIT P.

~~C. S. H. SPL. EXR.~~

M. P. EWING.

Oil Still.

No. 58.020.

Patented Sept. 11, 1866.

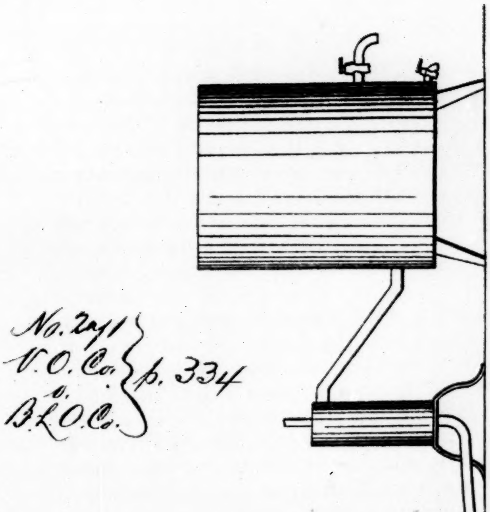


Fig. 1.

No. 2071
V. O. Co.
v.
B. L. O. Co. } p. 334

Fig. 3.

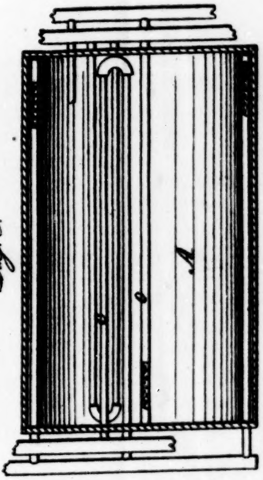
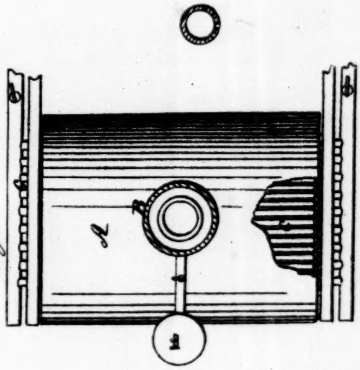


Fig. 2.



Witnesses:
D. L. Pickard.
Jay Hyatt.

Inventor:
M. P. Ewing
By J. Fraser & Co.
Attys

335

UNITED STATES PATENT OFFICE.

M. P. EWING, of Rochester, New York, assignor to H. B. Everest and Geo. P. Ewing.

Improved Material for Lubricating and Other Purposes.

Specification forming part of Letters Patent No. 58020, dated September 11, 1866.

To all whom it may concern:

Be it known that I, M. P. Ewing, of Rochester, in the county of Monroe and State of New York, have invented a new and improved product from petroleum for lubricating, currying, &c.; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings.

Figure 1 is a central vertical section of a vacuum-still for producing the oil; Fig. 2, a plan of the retort; Fig. 3, a diagram, showing the steam-pipe coils.

Like letters of reference indicate corresponding parts in all the figures.

A patent has recently been allowed me for improvement in vacuum-stills for petroleum, one essential novelty consisting in the combination of a continuous feed with the vacuum-retort, by which I am enabled to maintain about the same level of the oil in the retort at all times, and by the removal of atmospheric pressure raise the vapor by steam at a comparatively low temperature without the direct application of fire, and thereby avoid burning.

In addition to the production of a refined quality of volatile oil, I also produce as a residuum a material that possesses superior qualities over other similar products for lubricating, currying, and other purposes, and which may be burned in an ordinary sperm-oil lamp without danger.

The drawings represent an apparatus for distilling, substantially the same in principle as that covered by the aforementioned patent recently granted me.

A is a retort, into which the crude oil is continuously fed by a pipe, *a*, and from which the residuum is discharged by pipe *b*. In the bottom of the retort are situated coils of steam-pipe *c* for heating the oil.

A neck or tube, B, connects the retort with a condenser, C, into which the oil-vapor is carried, and this vapor is condensed by a constant jet of water entering from pipe *d*. From the condenser the oil and water are drawn by a pipe, *f*, connecting with a suitable pump, which also serves to exhaust the air from the apparatus; or, if desired, the air may be exhausted by a Torricellian tube, or by admitting steam, or any other desired method.

Air is admitted to the retort or condenser at any time by means of cocks *g h*. These constitute the general features of the apparatus by which I am enabled to produce a residuum or product from the distillation of a very superior character, and possessing qualities that, so far as I am aware, were never known prior to my invention.

The crude or natural petroleum of heavy gravity, with but little or no treatment, has been used to some extent for lubricating purposes. The light or volatile elements, which always accompany it in its crude state, have been a source of great annoyance, from the fact that they develop themselves into offensive odors when in use, and also from the fact that in most crude oils there is combined so large a proportion of these volatile elements as to render them of too light a gravity for lubricating purposes. These volatile portions also contain acid properties, which act with damaging effect upon most kinds of machinery.

The light hydrocarbon oils, so injurious to petroleum as a lubricator, comprise from fifteen to twenty per cent. in oils of heaviest gravity, and from thirty to sixty per cent. in oils of lighter gravity, as produced from the well. No successful method of separating these volatile and injurious portions, to any great extent, from petroleum, without injury to its heavier or oleaginous portions, has been known or practiced up to the time of my invention, to the best of my knowledge or belief.

Again, the residuum or black-oil, produced by distillation of the lighter portions from crude petroleum under atmospheric pressure, which contains burnt paraffine matters and emits offensive odors, has been used for machinery, both separately and combined with unctuous oils. Its impurities and offensive odors have kept it from being extensively used; also, a heavy paraffine-oil, the last product of destructive distillation, is in limited use; but, being a distilled product, it evaporates again, and whether used as a lubricating-oil or as a currier's oil, it readily passes off by evaporation, which is a source of difficulty.

336 My invention consists in the production from the natural petroleum of an oil of heavy gravity, free from offensive odors, containing all the oleaginous and paraffine portions unburned, and having all, or nearly all, the hydrocarbon and acid properties removed, so that it will not evaporate when used as a currier's oil, and is superior to all other petroleum oils as a lubricator, and will stand the proper fire-test, and burns with success and safety in a common sperm-oil lamp.

The above beneficial results are produced and valuable oil obtained by the employment of an apparatus, as herein described, whereby the oil-product in the retort is reduced to the lowest possible gravity without burning by the evaporation of the volatile portions *in vacuo*, and by the use of steam or its equivalent.

I claim—

As a new manufacture, an oil-product, as above described, when produced from crude petroleum by the evaporation therefrom of the lighter hydrocarbons *in vacuo* by the use of steam or its equivalent, to prevent burning, substantially as herein set forth.

M. P. EWING.

Witnesses:
R. F. OSGOOD,
J. A. DAVIS.

(Here follows diagram marked p. 337.)

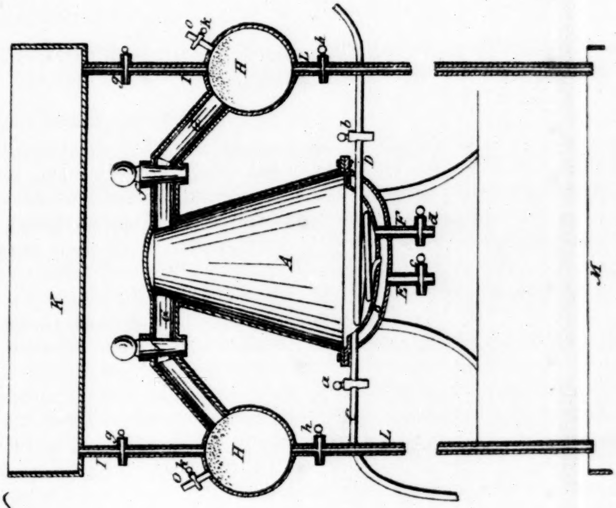
Defendants Exhibit G

M. P. EWING.

Oil Still.

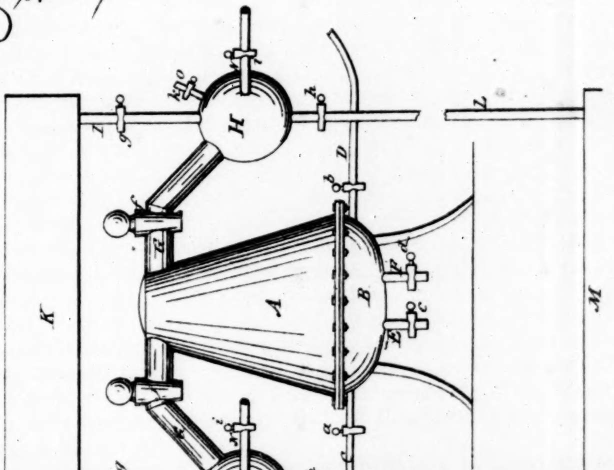
No. 56,852. Patented July 31, 1866.

Fig. 2.



No. 271
V.O.Co
B.L.O.Co
p. 337

Fig. 1.



Witnesses:

J. A. Davis

Inventor:

M. P. Ewing
By J. Fraser & Co
Attys

10

M. P. EWING, of Rochester, New York, assignor to himself and H. B. Everest, of the same place.

Improvement in Apparatus for Distilling Petroleum.

Specification forming part of Letters Patent No. 56852, dated July 31, 1866.

To all whom it may concern:

Be it known that I, M. P. Ewing, of Rochester, in the county of Monroe and State of New York, have invented certain new and useful improvements in distilling petroleum *in vacuo;* and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, making part of this specification.

Figure 1 is a side elevation of my improved apparatus; Fig. 2, a central vertical section of the same.

Like letters of reference indicate corresponding parts in both figures.

In the ordinary process of distilling petroleum it is necessary, in order to raise the vapor and overcome the pressure of the atmosphere, to bring the heat to a comparatively high temperature, the effect being usually accomplished by the direct application of fire to the retort or still. The oil, also, is deposited in the still in charges, it being impracticable to apply a continuous feed to a retort where so high a degree of heat is used as is necessary to raise the vapor against atmospheric pressure. In this manner not only is the material in the retort to be distilled liable to burn on the sides and produce lamp-black, that discolors the oil, but a large amount of gas is evolved by this excess of heat, imparting to the oil offensive odors and increasing its liability to explode; and, furthermore, the process is not complete without deodorization by the employment of acids and alkalies after the products have passed from the still. The residuum is also greatly injured by the same excess of heat.

In order to obviate these difficulties I employ the process of distillation *in vacuo*, which, by removing the pressure of the atmosphere, allows the vapor to evolve at a much less degree of heat, so that the simple application of steam, preferably superheated, accomplishes all that is required without liability of burning. By this method, also, I am enabled to complete the distillation, so that the naphtha and oil will be combined in one product, and to avoid the necessity of deodorization and the contamination of the oil with acids and alkalies. At the same time the product of the distillation is of a far superior character, being of less gravity and capable of enduring a higher fire or coal test.

My invention consists, first, in the combination of a continuous feed with a vacuum still, so arranged that the oil can be made to stand at nearly the same level in the retort at all times, while the vaporization is produced with the minimum amount of heat; second, in the combination of a jet-condenser with a vacuum still for rapidly condensing the vapor; third, in the combination of two or more condensers with the still, so arranged that each may be used alternately to preserve the vacuum and insure a constant action of the still; fourth, in the particular arrangement of the apparatus as a whole.

As represented in the drawings, A is a retort made air-tight and provided with a steam-jacket, B, at the bottom. Into the retort opens a feed-pipe, C, for admitting the oil, and a steam-pipe, D, for admitting steam. The steam-pipe preferably ends in a coil inside and discharges into the steam-jacket, whence it escapes by an eduction-port, E. From the bottom of the retort also extends a pipe, F, for discharging the retort of the residuum of the distillation.

From near the top of the retort, on opposite sides, extend tubes or passages G G, connecting at the opposite ends with condensing-chambers H H.

The condensing-chambers are provided at the top with induction-tubes I I, that extend upward to a water-receptacle or fountain, K, and at the bottom with eduction-tubes L L, which rest over a suitable tank, M, and are made of such length that a column of water or oil therein will be balanced by the atmosphere below the condensers. The condensers are also provided with steam-pipes N N and air-openings O O.

The several tubes and pipes above mentioned are provided with cocks *a*, *b*, *c*, *d*, *f f*, *g g*, *h h*, *i i*, and *k k*.

The action of the apparatus will be readily understood. It is necessary, first, to exhaust the air both from the condensers and the retort. To accomplish this the cocks are all closed except *g g* of the induction water-pipes and *k k* of the air-pipes, connected
339 with the condensers. The opening of the cocks *g k* allows the condensers to fill with water and the air to escape. When the condensers are full these cocks are closed and the cocks *h h* of the eduction water-pipes are opened. The liquid then falls into the tubes, leaving a vacuum in the condensers. The cocks *h h* are now closed, and the cocks *f f* opened, which allows the air in the retort to pass into the condensers. The cocks *f f* are again closed, and *g h* again opened, to exhaust the condensers in the same manner as before. This process is repeated till an effective vacuum is formed in the whole apparatus.

It is obvious that instead of this method of exhaustion an air-pump might be connected with the condensers, or the vacuum might be made by the admission of steam from the pipes N N, acting on the same principle of the water-exhaustion above described.

When the vacuum has been established the crude oil is admitted to the retort by opening the cock *a* of the feed-pipe. No pump is required, since the pressure of the atmosphere is sufficient, by reason of the vacuum, whether the oil is drawn from above or below the level at which it stands in the retort. Steam is now let on through the pipe D, and the vapor evolved passes through the tubes G G into the condensers. Here the vapor is condensed by allowing jets of water to flow into the condensers by opening slightly the cocks *g g*.

The condensed oil and the water pass off together through the pipes L L into the tank M, where the oil rises on top and is easily separated.

In the distillation of petroleum the use of the vacuum-still secures several very important advantages. In order to produce boiling of petroleum in the open air a temperature of about 600° is required; in a vacuum the same effect is produced at about 200° or 250°. Vaporization does not effectively commence until the boiling-point is reached, and if this point can be reached at less than the ordinary temperature a great gain will be effected in a general way. Where so great a heat is employed as in the ordinary still (and especially where fire is applied directly to the retort), the material burns upon the sides and produces lamp-black, that passes into the oil, and not only discolors it, but imparts a disagreeable odor, and also injures its quality. This is especially the case when the oil is introduced through the top or sides of the still at intervals and in given quantities, each of which are distilled before the addition of another. In this case, when a new quantity is added, its contact with the highly-heated surface of the retort that was before uncovered will cause it to scorch; or where the oil is boiled low the same effect will be produced.

I obviate this difficulty, first, by employment of the vacuum, by which I am enabled to reduce the temperature, so that it is less liable to burn; and, second, by the employment of the feed-pipe C, which enables me to allow a constant flow of the material into the retort to supply the place of that which is distilled. In this manner it will be seen that I can gage the flow through the feed-pipe, so that the material will stand at nearly the same level in the retort at all times, and therefore the material never comes in contact with a bare heated surface, either by overflow or by diminution. This combination of the continual flow with the vacuum-retort is of the utmost importance, and was never known before my invention, to the best of my belief. In addition to this the action of a given quantity of heat upon a given quantity of liquid, or a quantity standing always at the same level, produces a uniformity in the action that is of great importance in distilling so volatile a material as petroleum. If the quantity in the still under action should materially increase or diminish, a corresponding effect would be produced in the product. Thus, in an increase of the quantity in the still, with a given degree of heat, the first product would be simply naphtha, since that element is the most volatile, and the oil would be raised afterward, forming thus two products, as is now the case in the ordinary still. By preserving a given temperature and a uniform and unvarying quantity of the liquid in the still, as by my method, I am enabled to pass both the naphtha and oil as one product, which is of a far superior quality to the oil ordinarily produced. This result depends in a great measure, however, upon the employment of the vacuum.

Although a certain degree of vapor is raised at a slight heat, vaporization does not become effective till the boiling point is reached. Thus in the ordinary process the first action of the heat raises naphtha; but as soon as the tension of the vapor overcomes the pressure of the atmosphere boiling commences, and the oil is raised. In the use of the vacuum the pressure of the atmosphere is removed, and there is no resistance to boiling and the rapid evolution of vapor, and the whole naphtha and oil therefore passes off in one body. This effect of the vacuum is special in the distillation of petroleum.

The jets of water constantly flowing into the condensers H H from the pipes I I condense the vapor of the oil in the same manner that the jet condenses the steam in the condenser of a steam-engine. In this manner the vapor is condensed as fast as formed and escapes downward. This enables me to run off the still very rapidly. Where the ordinary worm is employed the condensation is necessarily slow, and would not answer in application to the vacuum-still, where the vaporization is so rapid. In this case there would be an accumulation of vapor, which would interfere very materially with the efficiency of the apparatus. The employment of the jet-condensers removes all difficulties of this kind.

In addition to this, the moment the jets open into the condensers they are broken into spray and effectively intermingled with the oil vapor in such a manner as to thoroughly wash it.
340 This action has a tendency to deodorize the oil and purify it, saving the application of chemicals of any kind for the purpose.

The employment of two or more condensers enables me to use them alternately, if desired. Thus one can be employed to preserve or restore the vacuum as it becomes impaired by the gradual admission of air, or they can be used alternately in this way, thus avoiding the suspension of distillation; or, where a series of stills are employed, a series of condensers may be employed with them, connected together, in which case a less proportional number of condensers may be employed, and the whole number of condensers made to bear at any time upon a single still, or the whole may be made to act on all the stills.

By the process herein described I produce the most beneficial results. The process of evaporation *in vacuo* is old, but the object has been to reduce a liquid to a semi-liquid or solid form, the aqueous matter being passed off as worthless, while the residuum was retained. The opposite is the object in distillation, for the vapor is retained, while the residuum is the least valuable product. In this much, then, the two processes differ.

The effect of the vacuum process in distilling petroleum is special. The naphtha and oil are produced in one body instead of two, as by the old method. There is no admixture of acids and alkalies, since there is no need of deodorization. The oil is therefore purer and better. By using a low temperature, and this produced only by steam or heated air, the chemical changes are avoided that are produced by a high temperature. The still can run constantly without stopping to clean, and no incrustation forms on the inside. A larger amount of oil is produced and of a better quality. It is of one quality, of 50° specific gravity, bearing a heat-test of 135° and a cold-test of 30° below zero, while ordinary oil, 45° gravity, will stand a heat-test of but 110°, and congeals at a cold-test of 3° below zero.

DEFENDANT'S EXHIBIT R

~~C. R. H. SPL.~~ EXR.

A. THIRAULT.

Distilling Petroleum.

No. 63,963. Patented April 16, 1867.

No. 241
V. O. Co
v.
B. L. O. Co
} p. 341

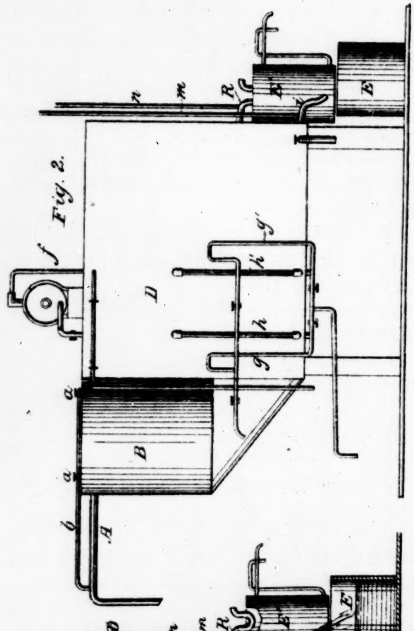


Fig. 2.

Fig. 1.

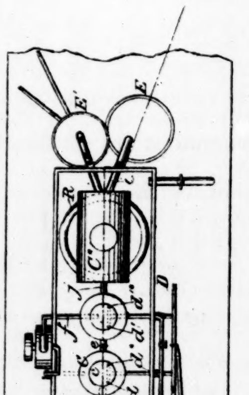


Fig. 3.

Witnesses:
Alex F. Roberts
J. McCrongham

Inventor:
A. Thirault

The residuum, also, not being burned or scorched by overheating, is rendred a very valuable product.

What I claim as my invention, and desire to secure by letters patent, is—

1. The combination of a continuous feed with a vacuum-still for petroleum, operating substantially as and for the purposes herein set forth.

2. The combination of a jet-condenser with a vacuum-still for petroleum, operating substantially in the manner and for the purpose herein specified.

3. The combination of two or more condensers, H H, with each other and a vacuum-still, A, in such a manner that the action may be alternated from one to another to preserve the vacuum and to allow the constant running of the still, as set forth.

4. The arrangement as a whole, consisting of the retort A, condensers H H, connected by the tubes G G, and pipes I L, operating substantially as and for the purpose specified.

M. P. EWING.

Witnesses:
R. F. OSGOOD.
J. A. DAVIS.

(Here follows diagram marked p. 341.)

342 UNITED STATES PATENT OFFICE.

ALEXIS THIRAULT, of Williamsburg, New York, assignor to himself and B. S. Hilton, of New York city.

Improved Apparatus for Treating Petroleum.

Letters patent No. 63963, dated April 16, 1867; antedated April 5, 1867. The schedule referred to in these letters patent and making part of the same.

To all whom it may concern:

Be it known that I, Alexis Thirault, of Williamsburg, in the county of Kings and State of New York, have invented a new and improved apparatus for treating petroleum; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 represents a longitudinal vertical section of this invention, the line *x x*, Fig. 3, indicating the plane of section.

Figure 2 is a side elevation of the same.

Figure 3 is a plan or top view of the same.

Similar letters of reference indicate like parts.

This invention relates to an apparatus which receives the oil as the same leaves the still, and which is composed of a condensing coil from which the oil passes into one or more tanks. These tanks are closed, and they are provided with steam pipes extending down to different depths, so that by letting steam into the oil an agitation is produced whereby the light parts are carried off and separated from the heavy parts, and at the same time the waste of a portion of the useful constituents of the oil is prevented.

A represents a condensing worm, which is enclosed by the water jacket B. Through this worm passes the oil as the same runs from the still, and on discharging from the coil the oil collects in a cylindrical tank, C. While passing through the coil the oil is exposed to the action of steam, which is introduced through one or more pipes, *a*, branching off from the steam pipe *b*. The steam acting on the oil in the condensing coil chases the same ahead and causes the still to run freely. The tank C is provided with a closely fitting cover, *c*, and the oil in the same is permitted to rise to about a level with the discharge spout of the coil A. On discharging from this coil the oil is met by a jet of steam which is introduced into the tank C, through a pipe, *d*, branching off from the steam pipe *b*, and terminating opposite the discharge spout of the coil. Another pipe, *d**, which also branches off from the steam pipe *b*, extends down below the level of the oil in the tank C, and the steam issuing from that pipe serves to agitate the oil in the tank. Said tank is situated in a water jacket, D, through which a current of cold water passes, so that the vapors, or a portion thereof, and the steam which enter the tank are condensed. Those portions of the oily vapors which do not condense in the tank C, pass through the pipe *e* into the tank C′, which is similar to the tank C and situated close to the same in the water jacket D. The liquid contents of the tank C, or, more properly speaking, the oil which accumulates in the same, is pumped over into the tank C′, and on issuing from the pipe *f* it meets a jet of steam which is introduced through a pipe, *d′*, branching off from the steam pipe *b*. Another pipe, *d′**, which also branches off from said steam pipe, extends below the level of the oil in the tank C′, and the steam issuing from the same serves to agitate the contents of said tank. The water resulting from the condensation of the steam in the tanks C C′ is drawn off through the pipes *g g′*, and these pipes form siphons, as shown in Fig. 2, so as to prevent the escape of gases from the tanks. Suitable stop-cocks in the several pipes serve to regulate the flow of the liquids and of the steam. The height of the liquid in the tank C C′ is observed by means of glass gauges *h h′*, which are attached to the outside of the jacket D, and communicate with the tanks, as shown in Figs. 2 and 3 of the drawing. By this treatment the light parts of the oil are completely separated from the heavy parts. The heavy parts collect in the lower portion of the tank C′, and they pass off through the coil *i*, the end of which extends through the end of the jacket D and causes the liquid to discharge into the barrel or receiver E. The light parts of the oil which accumulate in the upper portion of the tank C′ escape through the pipe *j* into the tank C*, which is lower and of a different shape than the tanks C C′, but which may be made similar to said tanks, or in any other suitable form or shape. In this tank, which is also enclosed in the jacket D, and surrounded by the cooling medium contained in said jacket, the light vapors are

condensed, and the products resulting from this condensation are carried off through the coil k, the discharging end of which passes through the end wall of the jacket and carries the oil running from it into a barrel or receiver, E'. The gaseous parts which may still be mixed with the oil as the same flows from the tank C' through the coil i are allowed to rise through the pipe l, which connects with the pipe j, and such vapors which are still mixed with the oil
343 as the same discharges from the coil i escape in the open atmosphere through the pipe m. A similar pipe, n, carries off the uncondensed vapors mixed with the oil escaping from the coil k. By this apparatus the distillation of petroleum oil and other liquids can be greatly facilitated, the flow of the stills being accelerated by the action of the steam; and, furthermore, by the steam acting on the vapors and liquid while the same are condensing or about to condense, a thorough separation of the oil takes place and none of the heavy parts are allowed to escape with the light and non-condensable vapors. The yield of oil is thereby increased and all danger arising from the explosive vapors is avoided; and, furthermore, by the action of the steam, the oil is deodorized and a pure white product is produced.

What I claim as new, and desire to secure by letters patent, is—

1. The arrangement of one or more steam jets, a, in combination with the condensing coil A, constructed and operating substantially as and for the purpose set forth.

2. The steam jets d or d', applied in combination with tanks C or C', and with the pipes carrying the oil into said tanks, substantially as and for the purpose described.

3. The jets d^* or d'^*, in combination with the tanks C or C', constructed and operating substantially as and for the purpose set forth.

4. The combination of the coil A, tanks C C' C^*, steam jets a d d^* d' d'^*, and coils k i, all constructed and operating substantially as and for the purpose described.

A. THIRAULT.

Witnesses:
M. M. LIVINGSTON.
W. HAUFF.

344 DEFENDANT'S EXHIBIT S.

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE.

To all persons to whom these presents shall come, Greeting:

This is to certify that the annexed is a true copy from the bound volumes of this office of the specification and drawing in the matter of the English letters patent granted George Hamilton January 18, 1859, number 149, for "improvements in treating rosin and resinous substances to obtain products therefrom and in treating the products, &c.

In testimony whereof I, E. M. Marble, Commissioner of Patents, have caused the seal of the Patent Office to be affixed this 30th day of June, in the year of our Lord one thousand eight hundred and eighty-three, and of the Independence of the United States the one hundred and seventh.

[L. S.] E. M. MARBLE,
Commissioner.

345 A. D. 1859, 18th January, No. 149.

Treating Resinous Substances, &c.

Letters patent to George Hamilton, of Liverpool, in the county of Lancaster, professor of chemistry, Queen's College, Liverpool aforesaid, for the invention of "improvements in treating rosin and resinous substances to obtain products therefrom, and in treating the products obtained from rosin and resinous substances." Sealed the 15th July, 1859, and dated the 18th January, 1859.

Specification in pursuance of the conditions of the letters patent filed by the said George Hamilton in the Great Seal Patent Office on the 16th July, 1859.

To all to whom these presents shall come I, George Hamilton, of Liverpool, in the county of Lancaster, professor of chemistry, Queen's College, Liverpool aforesaid, send greeting:

Whereas her most excellent majesty, Queen Victoria, by her letters patent, bearing date the eighteenth day of January, in the year of our Lord one thousand eight hundred and fifty-nine, in the twenty-second year of her reign, did for herself, her heirs and successors, give and grant unto me, the said George Hamilton, her special license that I, the said George Hamilton, my executors, administrators, and assigns, or such other as I, the said George Hamilton, my executors, administrators, and assigns, should at any time agree with and 346 no others from time to time and at all times thereafter during the term therein expressed, should and lawfully might make, use, exercise, and vend within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man an invention for "improvements in treating rosin and resinous substances to obtain products therefrom and in treating the products obtained from rosin and resinous substances" upon the condition (amongst others) that I, the said George Hamilton, my executors or administrators, by an instrument in writing, under my or their or one of their hands and seals, should particularly describe and ascertain the nature of the said invention and in what manner the same was to be performed, and cause the same to be filed in the Great Seal Patent Office within six calendar months next and immediately after the date of the said letters patent:

Now, know ye that I, the said George Hamilton, do hereby declare the nature of my said invention and in what manner the same is to be performed to be particularly described and ascertained in and by the following statement (that is to say):

The object of this my said invention is to treat rosin and resinous substances or products derived from rosin or resinous substances so

as to obtain from them spirits, oils, acids, resins, and other substances, but especially to obtain direct from common rosin, by one distillation, a variety of clear and pale oils free from the blue colour and strong odour which characterize ordinary rosin oils, and at the same time to obtain the spirit, acid, and
347 oils all of such purity that they will not require any subse-
quent rectification or other treating. To obtain these advantages I apply the heat to the still or retort containing the substance to be operated upon in such a manner that I can regulate the temperature to any required degree, always commencing with the lowest temperature which will suffice to cause the most volatile products to pass off, and then, when the products of that or any other required temperature cease to be evolved, I then gradually raise the temperature until evaporation again takes place from the contents of the still or retort, by which I obtain another less volatile product than that obtained at the lower temperature. After I have exhausted all the products that can be obtained at this heat I again raise the temperature until the less volatile product is evolved; and so on by successive increments of temperature I bring off successively the less volatile products until no further volatile products can be obtained from the contents of the still. To cause the evaporation within the still to take place at as low a temperature as possible I diminish the pressure within the retort or still to any desired extent by an air pump or its equivalent, and receive the products of distillation in an exhausted receiver, and I construct the still or retort in such a way that in place of the outlet orifice being at the head of the still the vapours leave the still as near the surface of the contents of the still as practicable, to accomplish which I construct the still with several outlets, one below another, and which are provided with stop-cocks, which can be opened in succes-
348 sion as the contents of the still are reduced; or I construct
the still in such a manner that it may be mounted on an axle or a pair of trunnions, so that it may be tilted on one side, that the outlet orifice may be lowered at pleasure during the operation of distillation, a glass gauge being used to show the height of the contents of the still. I separate those products which rise in vapour together during distillation at the same temperature, but which, when condensed into the liquid state, are capable of being separated by alteration of temperature and subsidence. I draw off the heavier through the bottom of the receiver and the lighter through the side thereof, or by first drawing off the heavy portion through the bottom of the chamber into a receiver, and afterwards the lighter portions into another vessel or vessels. When desirable, I repeat the processes hereinbefore described on each or any of the products obtained as described until no further separations can be effected.

That this my said invention may be the more readily seen and understood, I have hereunto annexed drawings in partial illustration of so much of the apparatus which I believe to be best suited to carry the same into practical effect. Like letters and figures marked thereon are used to denote similar parts. A, the still (shown by the dotted lines) enclosed within B, an outer jacket or casing. C is a man-hole in the top of the still, which is covered by a metal cover ground

air-tight. D is a man-hole through the outer casing of the still, which is covered by a tight lid, which is securely held in
349 position by E, a set screw, which works through F, a small movable cross-beam, which is hinged at one end and locked at the other by a pin to F, two small standards on the top of the retort casing; G is a small safety valve on the man-hole lid; H, a pipe for introducing water between the jacket and still for heating and generating steam for heating the still; I, a pipe for withdrawing the water when required; K, a pipe which connects the interior of the still with the condensing worm; k, k', and k^2 are junction pipes, provided with stop-cocks, which are opened in succession as the liquid contents of the still are reduced for the purpose of allowing the products of distillation to pass off as near the surface as practicable. I prefer to construct these junction pipes so that their diameters expand from the plug of the stop-cock towards the body of the still; l, l', and l^2 are small screwed taps on the junction pipes for affixing an exhausted flask upon, for the purpose of ascertaining the state of the contents of the still; L, the refrigerating vessel, containing the condensing worm, which is of the ordinary description, and is connected to M, the upper receiver, which is a tight vessel of capacity, which I prefer to form of a barrel shape; N, the lower receiver, into which the liquid contents of the upper receiver are occasionally drawn off; n, frame-work, upon which the receivers are supported; O, the pipes, by which the incondensable portions of the products of distillation (which chiefly consists of carburetted hydrogen) are withdrawn from the apparatus, which I do by means of an air pump attached thereto, and which I preserve in a common gasometer for use
350 as an illuminating gas or a heating medium for working the still or retort; P, a glass gauge for ascertaining the liquid contents of the upper receiver; Q, a junction pipe, with a stop-cock for withdrawing the liquid contents of the upper receiver (M) into (N) the lower receiver, which is done by opening R, a stop-cock on the exhaust pipe in connection with the air pump; S is a draw-off tap on the botton of the lower receiver for drawing off the heavy portions of its liquid contents, and T is a tap on the end of the lower receiver for drawing off the lighter portions of the liquid, which is done by closing the taps Q and R and opening U, a stop-cock on W, a pipe in conjunction with the gasometer, which supplies the lower receiver with gas to allow the liquid contents to flow through the taps S and T; I receive the liquid contents of the receiver into suitable vessesls, which are provided on the sides and bottom with cocks for drawing off the liquids of various gravities. These receivers may be placed upon a table which will turn on its vertical axis for the purpose of allowing the liquids to be conveniently discharged into separate vessels that may be placed thereon within range of the draw-off taps; X, a small pipe fitted with a screwed tap on the upper part of the upper receiver, which is used for exhausting; Y, a flask, which is fitted with a stop-cock screwed on the end for attaching it to the screwed stop-cocks (l, l', and l^2) on the junction pipes of the still; Z, a thermometer for indicating the temperature within the still.

351 When it is not desired to obtain the whole of the volatile products, gaseous as well as liquid, nor the whole of the liquid products, in their highest degree of purity, as in the distillation of common rosin, for the purpose of obtaining the oils, I recommend a still (with or without a jacket or outer casing), and the worm and an open receiver, which is provided with draw-off cocks at the bottom and sides, and a glass gauge for enabling the operator to see the state of the contents of the open receiver; and in some cases I also dispense with the work, using only a low heat in the still. I am enabled to do this by allowing the products of distillation to escape near the surface of the liquid contents of the still, which would not at the low temperature used rise sufficiently high to pass out of the ordinary still outlet orifice. By the most imperfect and least expensive of these arrangements, even without a worm cooler, products may be obtained direct from rosin by a single distillation better than they can be produced by any method now in use with two or three distillations.

When I use ordinary fuel, such as coal or coke, for working the still, I regulate the temperature by dampers and other appliances, as is well understood, but in most cases I prefer to use the gas collected in the gasometer described.

Having now fully described and ascertained the nature of this my said invention, and how I believe it may be best carried into practical effect, I wish it to be understood that I do not confine myself to the precise details or dimensions hereinbefore set forth 352 and described, as it will be obvious to those practiced in the art that they may be considerably varied without departing from the invention; but what I do claim is—

First. The distilling of rosin and resinous substances and the products obtained therefrom into a vacuum or partial vacuum, as hereinbefore described.

Secondly. Constructing the still or retort in such a way that the exit orifice or orifices may be lowered as the liquid contents of the still are reduced, substantially and in the manner hereinbefore described, or any mere modification of the same.

Thirdly. The use of an open receiver with glass gauge and stopcocks at the sides and bottom for effecting the separation of liquids of different specific gravities, as hereinbefore described; and, lastly, the peculiar system of treating rosin and resinous substances for the purpose of obtaining products therefrom, substantially and in the manner hereinbefore described and set forth, or any mere modification of the same.

In witness whereof I, the said George Hamilton, have hereunto set my hand and affixed my seal this fifteenth day of July, in the year of our Lord one thousand eight hundred and fifty-nine.

GEORGE HAMILTON. [L. S.]

Witness:
WILLIAM WALKER,
44 *Castle Street, Liverpool.*

(Here follows diagram marked p. 353.)

354 **DEFENDANT'S EXHIBIT T.**

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE.

To all persons to whom these presents shall come, Greeting:

This is to certify that the annexed is a true copy from the files of this office of the specification and drawing in the matter of the letters patent granted Edward Braggins, March 7, 1865, number 46633, for improvement in oil still.

In testimony whereof I, E. M. Marble, Commissioner of Patents, have caused the seal of the Patent Office to be affixed this 30th day of June, in the year of our Lord one thousand eight hundred and eighty-three, and of the Independence of the United States the one hundred and seventh.

[L. S.] E. M. MARBLE,
Commissioner.

(Here follows diagram marked p. 355.)

356 *Specification Forming Part of Letters Patent No.* 46663, *Dated March 7th*, 1865.

To all whom it may concern:

Be — known that I, Edward Braggins, of Titusville, in the county of Crawford, State of Pennsylvania, have invented a new and improved machine and mode of distillation for the distillation of petroleum or rock oil; and I do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawings and the letters of reference marked thereon.

The drawing represents an internal view of my invention, with all the parts adjusted in working order.

B B is a steam tub or jacket surrounding an oil retort, A; U is a tube to draw off the condensed steam; G is an escape pipe; F a tube into the retort by means of which oil may be pumped by a force pump into the retort A; E is a steam tube letting the steam into the tub B B; between the tub and the retort H is a tube from the cover T T of the retort A; K is a condenser, surrounded by the jacket L L; M is an air pump to be used to assist in forming a *vacuo* in K, if necessary; P is a water tank from the bottom of which is a tube, N, to fill the jacket L L with water around the condenser K; O is another tube to fill the condenser K with water, and R is a tube by means of which the condenser K may be emptied.

1, 2, 3, 4, 5, 6, 7, 8 are stop-cocks. My invention operates as follows, to wit:

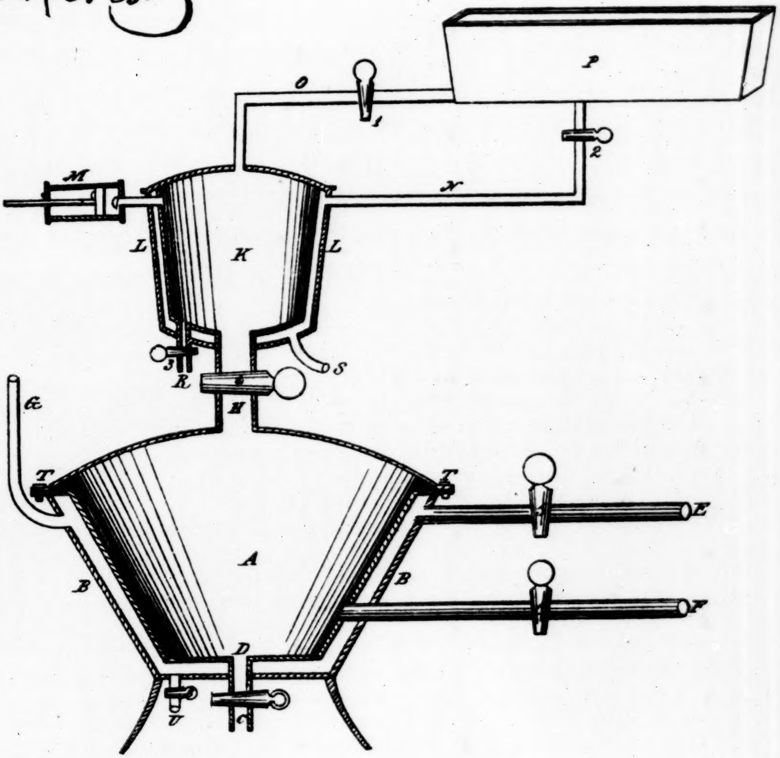
357 Stop-cock 4 is closed and 1 opened, which fills the condenser with water; the retort A having first been filled with oil, the cock 3 in the tube R is now opened and cock 1 closed. This tube R may and should be a number of feet in length, and it then "draws" on the water in K with a force like the long leg of a syphon, but the water in K cannot run out, as it would thereby leave a vacuum in the upper part of K.

E. BRAGGINS.

Oil Still.

No. 46.633. Patented Mar. 7. 1865.

No. 291
V.O.Co.
v
B.L.O.Co. } p. 355



Witnesses:

A B Richmond
Ira H. Pierce

Inventor.

Edward Braggins

DEFENDANT'S EXHIBIT **U.**

~~C. D. H.~~ SPL.- EXR.

I. Newton,

Steam-Boiler Superheater.

N°54,757. Patented May 15, 1866.

No. 271 }
V. O. Co. } p. 358
B. & O. Co. }

Fig. 1.

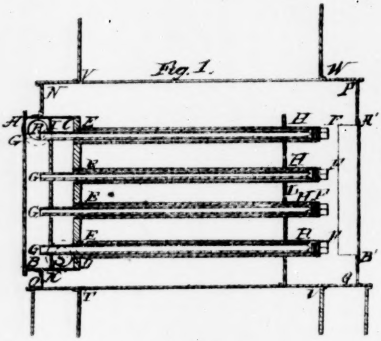


Fig. 3

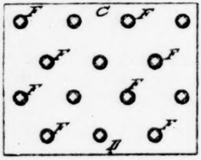


Fig. 2

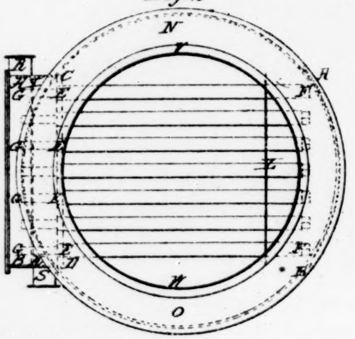
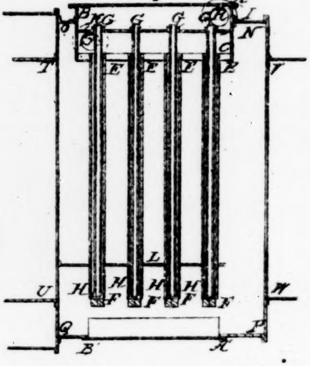


Fig. 4



Witnesses:

J. W. Coombs

J. F. Dohm.

Inventor.

Isaac Newton

Stop-cock 5 is now opened and steam let in around the retort A until the oil in the same is heated to the desired degree of temperature. Now open the cock 4 and the vapor of the heated oil will ascend through the tube H and fill the condenser K, taking the place of the water. By this arrangement the oil may be distilled at a much lower temperature than by any other method, as the water in its effort to escape from the condenser K through the open tube R "pulls" on the oil in the retort, and, as it were, assists the heat of the steam which pushes from below, thereby bringing two forces in operation to assist in the volatilization of the oil.

The air pump may be used, worked by an engine, to create a vacuum in K in the place of water.

By this method of distillation the oil is distilled at a very low temperature, thereby avoiding the discoloration of the refined oil. This method is much safer, as no fire is near the oil. The retort A may be constructed of any size or shape best adapted to heating by steam.

And the condenser may be of any size desired, as the larger the size and the greater number of discharge tubes like R there is in the same the greater the force exerted on the oil in the retort A.

When the distillation is finished the residuum of the oil or tar may be drawn off through the tube C by opening the cock 7.

What I claim as my invention and desire to secure by letters patent of the United States is as follows, to wit:

First. I do not claim the distillation in vacuum as a novelty, for it has been done before.

Second. But I claim the method described of producing a vacuum in the condenser K by water in the manner described, when done by the aforesaid combination for the purposes set forth; I therefore claim the combination of the water tank P with tubes O & N, the condenser K, the tube R, and the retort A with the tubes E, F, C, when the same are constructed as described and in the aforesaid combination for the purposes set forth.

EDWARD BRAGGINS.

Witnesses:
A. B. RICHMOND.
IRA H. PIERCE.

(Here follows diagram marked p. 358.)

359

UNITED STATES PATENT OFFICE.

ISAAC NEWTON, of New York, N. Y.

Improvement in Superheating Apparatus.

Specification forming part of Letters Patent No. 54757, dated May 15, 1866.

To all whom it may concern:

Be it known that I, Isaac Newton, of the city, county, and State of New York, have invented a new and useful improvement in superheating apparatus for steam-engines; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure one is a vertical section of a superheating apparatus constructed and applied according to my invention. Fig. 2 is a plan of the same. Fig. 3 is an end view of the apparatus. Fig. 4 is a vertical section, as in Fig. 1, showing the manner of bracing the circulating-chamber.

Similar letters of reference indicate corresponding parts in the several figures.

The prime conditions essential to the success of a superheating apparatus are that it shall not interfere with the draft of the boiler-furnace, either by contracting the calorimeter or by otherwise obstructing the passage of the heated gases of combustion, and that it will permit the easy detection of any defects in its tubes or joints and the removal and replacement of its tubes even while steam is in the boiler. The belief that these conditions have not been fulfilled by any of the superheating apparatus heretofore employed has led to this invention, which consists in an apparatus which, while it does not interfere with the draft, may be made to present any desirable amount of heated surface, over which the steam may pass on its way to the engine, is very simple and easy to construct and repair, particularly so far as replacing defective tubes is considered, and can be applied to existing steam-boilers without making alterations.

To enable others skilled in the art to make and apply my invention, I will proceed to describe it with reference to the drawings.

A B C D is a circulating steam chamber having a vertical partition, I K, and in the inner head, C D, of which one end of each of the nearly-horizontal circulating-tubes E F E F are screwed or otherwise firmly secured. Within these superheating-tubes internal circulating-tubes, G H G H, are inserted, the said circulating-tubes passing tightly through holes in the partition I K. The superheating-tubes E F E F are only fastened at one end, as above mentioned, but are supported near the other end by an upright steady-plate, L, which is perforated so that the said tubes may pass easily through it.

The apparatus thus described is inserted through a suitable opening in one side of and surrounded by a casing, N O P Q, which is placed between the exit T U in the boiler for the products of combustion and the base V W of the chimney. This casing is so proportioned that the superheating-tubes cannot impair the draft either by contracting the calorimeter, presenting obstructions to the passage of the gases or by reducing the temperature. This very important condition I fulfill by enlarging the area of the casing N O P Q around the superheater, above the exit or outlet in the boiler, and again contracting the size of the smoke-pipe above the superheater; and I place the superheating-tubes at a suitable distance above the exit or outlet T U, so that the products of combustion have ample space to pass unimpeded to the chimney by passing not only among but around the tubes to the smoke-pipe V W, which is attached to the top of this casing.

I construct the outer ends, E F, of the superheating-tubes E F E F either solid or closed by a cap or screw-plug, as shown in the drawings, and the circulating-tubes G H G H, I make either with the outer ends, H H, split and swelled out, as shown in the drawings, or perforated and supported on an extension of the screw plugs or caps. By securing one or more of the ends H H to the screw plugs or caps or closed ends of their respective tubes E F E F, and securing the other end or ends, G G, in the plate I K, the circulating-tubes may be made to brace the circulating-chamber.

It will be seen that this arrangement of tubes prevents any injury to the joints which might otherwise occur on account of unequal expansion and contraction by different temperatures in various parts of the apparatus.

In order to guard against the evil of water lodging in the tubes by the foaming of the boiler or other cause, I so fix the superheater within the casing N O P Q, already described, that the tubes will incline from a horizontal position with ends secured in the head C D the lowest. In order, also, that the greatest quantity of steam may circulate over the hottest parts of the superheating-tubes, which is the lower side, and thus transfer the greatest quantity of caloric from the products of combustion to the steam, I prefer to so insert the circulating-tubes G H and support them by the division-plate I K and within the superheating-tubes E F, that the internal annular space between the circulating and superheating tubes will be the greatest on the side next the outlet or exit from the boiler. Again, in order to accomplish the same end, I prefer to make the lower superheating and circulating tubes larger than those above, so that the greatest portion of the steam will pass through those tubes which are exposed to the highest temperature. And, again, to effect the same end, I propose in some cases to place two superheaters, as above described, one above the other, the steam from the boiler to enter the higher one—the one exposed to the lowest temperature—and then pass through the lower and hotter one before entering the engine. I propose to employ either one or all of these devices in combination to obtain a superheater of maximum efficiency under the conditions.

In the casing N O P Q, opposite the head into which the superheating-tubes are secured, and opening directly on the outer end of these tubes, I place a door, A′ B′, hinged or otherwise applied so that it may be easily opened, and of such dimensions as to admit of the tubes being examined at any time, and through which defective tubes, after being unscrewed, may be withdrawn and replaced with new ones.

By this arrangement it will be seen that the fundamental difficulty in existing superheaters is obviated, for by merely opening this door A′ B′ a faulty tube cannot only be promptly discovered but removed and replaced in a very few moments.

In order that repairs or examinations may be effected without even stopping the engine, I apply suitable stop-valves and connections, so that the steam may be taken direct from the boiler without passing through the superheater.

The operation of this apparatus is as follows: The steam from the boiler enters the outer compartment of the circulating-chamber A B C D by means of the nozzle R, which is connected by means of a pipe with the highest part of the steam space of the boiler. The steam thus entering fills the outer compartment of the circulating-chamber, and from thence enters the circulating-tubes G H G H, from which it passes through apertures in the ends H H into the superheating-tubes E F E F, which are exposed to the hot gaseous products of combustion from the boiler-furnaces on their way to the chimney. The steam, now superheated, enters the inner compartment of the circulating-chamber, to which is attached a nozzle, S, with which the steam-pipe leading to the engine is connected. The steam therefore entering the nozzle R from the boiler is forced to circulate over the hot surface of the superheating-tubes E F, and thus, before passing to the engine through nozzle S, is superheated.

The apparatus thus described appears to me to be suited to obviate the difficulties heretofore existing in the use of superheated steam so far as the means employed for heating it by the heated gases generated in a steam-boiler furnace is involved. Not only does it permit of the exposure of an adequate amount of superheating-surface to the hot gases leaving the boiler without impairing the draft, but it also provides for the perfect circulation of the steam over those surfaces, without which provision even the extensive surface would not be sufficient for the efficient transfer of the caloric from the hot gases to the steam before it enters the engine. At the same time these indispensable conditions are fulfilled there are no complicated parts, or, in fact, any difficult of access. By simply raising a latch and opening the door A′ B′ the entire fixture is exposed to view, and any of the tubes—the parts most liable to decay—can be readily inspected and replaced if necessary. Neither does it involve a boiler of peculiar construction or differing in any way from those usually built. By merely introducing a casing or box between the exit in any boiler on the base of the pipe or chimney the superheater can be readily applied.

What I claim as my invention, and desire to secure by letters patent, is—

1. The arrangement of a superheating apparatus composed of a system of tubes and a circulating-chamber within an enlarged casing or box, N O P Q, in relation to the outlet of the boiler and the base of the chimney, substantially as and for the purposes specified.

2. Bracing the circulating-chamber A B C D by securing one or more of the inner tubes to their corresponding outer ones at their ends H F, and their reverse ends, respectively, to the side C D and dividing-plate I K of the circulating-chamber, substantially as described.

3. The arrangement of the superheating-tubes within the casing N O P Q in relation to the circulating-chamber and to a door, A′ B′,

362

W. Elmer. Sheet 1 2 Sheets.

Manufacture of Gas.

No. 39905. Patented Sept. 15. 1863.

Fig 3

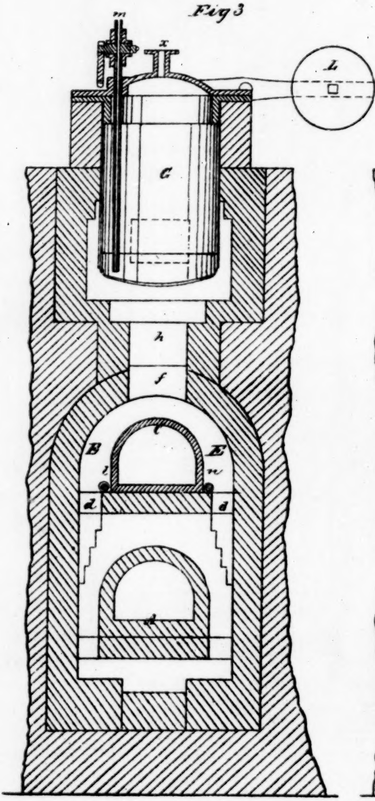
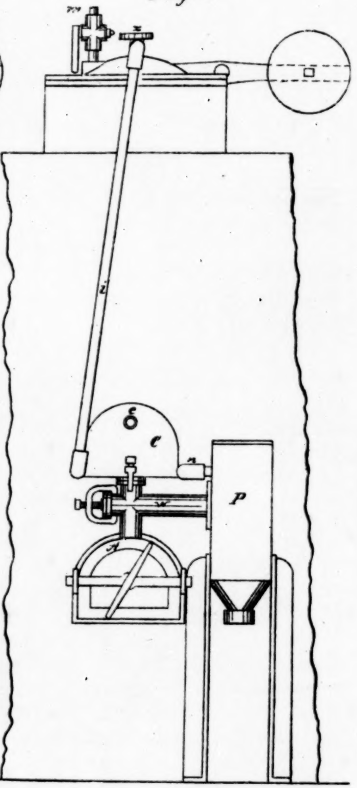


Fig 1



No. 271.
V. O. Co.
v.
B. L. O. Co. } p. 362

Witnesses
Jas. J. Wightman
W. L. Bennem

Inventor
William Elmer
by his Attorney
E. S. Renwick

in the said casing, substantially as herein specified, to provide for the removal and replacement of any of the said tubes.

ISAAC NEWTON.

Witnesses:
HENRY T. BROWN.
J. W. COOMBS.

361 DEFENDANT'S EXHIBIT V.

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE.

To all persons to whom these presents shall come, Greeting:

This is to certify that the annexed is a true copy from the records of this office of the specification and drawing in the matter of the letters patent granted William Elmer September 15, 1863, number 39905, for improvement in the manufacture of illuminating gas.

In testimony whereof I, Benj. Butterworth, Commissioner of Patents, have caused the seal of the Patent Office to be affixed this 22d day of September, in the year of our Lord one thousand eight hundred and eighty-four, and of the Independence of the United States the one hundred and ninth.

[L. S.] BENJ. BUTTERWORTH,
Commissioner.

(Here follow diagrams marked pp. 362 & 363.)

364 *Specification Forming Part of Letters Patent No.* 39905, *Dated Sept.* 15, 1863.

To all whom it may concern:

Be it known that I, William Elmer, M. D., of the city, county, and State of New York, have invented certain new and useful improvements in the manufacture of illuminating gas, and that the following is a full, clear, and exact description of my said invention, reference being had to the accompanying drawings, in which—

Figure 1 represents a front elevation of one division of a row of apparatus for manufacturing illuminating gas according to the principle of my invention.

365 Figure 2 represents a vertical section of the same through the centres of the retorts.

Figure 3 represents a vertical section of the same transversely to the retorts, following the line $x\ x$ of figure 2.

Figure 4 represents an elevation of the rear of the division, and—

Figure 5 represents a vertical longitudinal section of the condenser of the foreign matters from the hydrogen.

In two previous patents issued to me upon the fourth day of August, A. D. 1863, I described a process and apparatus for manufacturing illuminating gas by decomposing hydrocarbon in the presence of hydrogen produced by the decomposition of water. The present invention consists in certain improvements in apparatus for producing illuminating gas upon this principle.

The object of the first part of my invention is to produce the hydrogen in a separate vessel from that in which the olefiant gas is formed, and it consists substantially of the combination of the following devices or their equivalents, viz:

First. A retort in which water is decomposed to furnish hydrogen.

Second. A retort in which a fluid hydrocarbon is decomposed by heat.

Third. One or more furnaces for heating the retorts to the required temperature.

Fourth. Apparatus to supply water in regulated quantities to the retort in which it is decomposed (whether such water be supplied in liquid form or in the form of steam or vapor).

Fifth. Apparatus to supply a fluid hydrocarbon in regulated quantities to the retort in which it is decomposed.

366 Sixth. A connection to conduct the hydrogen from the retort in which it is formed to the retort in which the fluid hydrocarbon is decomposed.

The object of the second part of my invention is to free the hydrogen from condensable substances previous to its introduction into the retort in which the olefiant gas is formed, and it consists of the combination of the retort for the decomposition of the water with the retort for the formation of the illuminating gas through the intervention of a condenser.

The third part of my invention consists in the combination of a boiler for generating steam with the retort in which it is decomposed, through the intervention of a heating apparatus, so that the steam is heated after its generation and previous to its decomposition.

The fourth part of my invention consists of the combination of the hydrogen retort (or its equivalent for supplying hydrogen) with the retort for the formation of the illuminating gas through the intervention of a heating apparatus, so that the hydrogen is heated after its formation and previous to its manufacture into illuminating gas.

All the parts of my invention are embodied in the apparatus represented in the accompanying drawings, which illustrates one mode of carrying my invention into effect. The water is decomposed to furnish hydrogen in a retort, A, which is heated by a fire in a furnace, B, beneath it, and, as a lower temperature is required for decomposing the fluid hydrocarbons than for decomposing water, the retort C, in which the hydrocarbon is to be decomposed, is heated by the same fire as that for decomposing the water, both retorts being set in the same brick-work, and the flame, after passing around the latter retort A, being conducted by flues *d* to the former and being caused to envelope it before passing out of the 367 retort chamber E through suitable slots *f* in the arch over the retort. These retorts may both be made of iron or fire-clay. In the example represented the hydrogen retort A is made of fire-clay and the hydrocarbon retort C of cast iron.

In the present example the water to be decomposed is supplied to the hydrogen retort A in the form of steam, which, in order to em-

body the third part of the invention, is heated to a high temperature previous to its introduction into the retort. In order to obtain steam economically it is furnished by a boiler, G, which is heated by the products of the combustion escaping from the chamber surrounding the hydrocarbon retort *c*, and the flues *h j* are arranged in such manner that by varying the position of a damper, K, more or less of these products may be caused to pass around the boiler; thus the evaporation may be varied and the quantity of water supplied in the form of steam to the hydrogen retort may be regulated. The damper K in the present example consists of a fire-brick slab suspended from a lever and counterbalanced by a weight, L, so that it can be easily moved, and will retain the position in which it is placed. It is arranged in such manner, as shown by the drawing, that as one flue, *h*, is opened the other, *j*, is obstructed and *vice versa*, so that while the draught of the furnace remains the same the quantity of heat transmitted to the boiler G is varied by moving the damper. The steam from the boiler G passes through a pipe, *l*, enclosed in the retort chamber, so that the steam is highly heated previous to its introduction into the hydrogen retort. This retort is charged with some material which will decompose water, abstracting the oxygen and setting free the hydrogen. The substance which I prefer to use for decomposing the water is metallic zinc. This may be charged in a metallic state into the retort, so that when the heat is raised sufficiently the steam will act upon its vapor, or an ore of zinc, which will yield metallic zinc in the form of vapor when
368 sufficiently heated, may be placed in the retort. The boiler G is provided with a feed pipe, *m*, leading from some elevated source of supply, so that water can be conveniently supplied to the boiler when required.

The hydrogen retort A is connected with the hydrocarbon retort C, and in order to embody the second part of the invention a condenser, P, is interposed in the connection between the two retorts, so that such condensable matters as pass from the hydrogen retort with the hydrogen may be separated from it before it combines with the products of the decomposition of the hydrocarbon. The condenser in this example consists of a series of cells, R^1 R^2 R^3 R^4, three of which are separated by grated partitions S, while the last cell, R^4, contains water, under whose surface the hydrogen and its accompanying substances are introduced through a pipe, *t*, leading from the next preceding cell. The hydrogen passes from the condenser to the hydrocarbon retort C through a pipe, *n*, which, in order to embody the fourth part of the invention, is passed through the retort chamber E, so that the hydrogen is highly heated before its introduction into the hydrocarbon retort. In the present example the hydrocarbon used is supplied to the hydrocarbon retort in a liquid form from a reservoir, V, which is mounted upon the masonry of the retort chamber. This vessel communicates with the hydrocarbon retort by means of a pipe, *a*, fitted with a screw valve, *b*, by means of which the supply of hydrocarbon may be regulated. The hydrocarbon retort may not contain any solid substance, but it is better to fill it partially with fragments of bricks, so as to afford an increased decomposing surface. The gas produced in the hydrocarbon retort escapes through a pipe, *e*, and may be conducted directly to a gas-holder or may first be passed through a condenser to collect any liquid products that may be carried off in the form of vapor with the illuminating gas.

369 Olefiant gas contains about 86 per cent. by weight of carbon and 14 per cent. of hydrogen. The hydrocarbons which are available for the manufacture of illuminating gas contain a much larger percentage of carbon, and as the composition of almost each one differs from another, the quantity of hydrogen to be supplied to the hydrocarbon retort varies according to the hydrocarbon which is used. Water contains a certain determined percentage of hydrogen, so that when the quantity of hydrogen required for any particular hydrogen is known it may be supplied practically, with almost chemical accuracy, by decomposing a certain calculated quantity of water in the hydrogen retort for each portion of hydrocarbon supplied to the hydrocarbon retort. Thus when petroleum or rock oil, as it is frequently called, is the hydrocarbon used it is expedient to decompose six parts, by measure, of water for each eight parts, by measure, of petroleum supplied to the hydrocarbon retort. In order to enable the workmen to supply the proper quantity of water with facility, the interior of the boiler G in the present example is made of the same horizontal section as the interior of the hydrocarbon reservoir V, and each is provided with a glass gauge, *g y*, to show the height of the liquid within the vessel, a scale of equal division is applied to each gauge, and the lengths of the divisions on the water gauge *g* bear the same proportion to the lengths of those of the hydrocarbon gauge *v* that the quantity of water to be decomposed bears to the quantity of hydrocarbon to be decomposed at the same time; thus, if, as before supposed, petroleum be the hydrocarbon used, the lengths of the divisions of the water gauge should be six-eighths of those of the hydrocarbon gauge. Then, when the flow of hydrocarbon is adjusted, the evaporation of the water is adjusted by regulating the damper K, so that the liquids stands
370 on their two gauge scales at the same division or fraction
thereof as both vessels are progressively emptied.

When the apparatus thus described is in regular operation the steam generated in the boiler passes through the pipes l^1 l l^2 and enters the hydrogen retort A; it is there decomposed, the oxygen combining with the material used for that purpose, while the liberated hydrogen passes through the pipes *w n* and the condenser P to the hydrocarbon retort C. The hydrocarbon employed passes from the reservoir V through the pipe *a* to the hydrocarbon retort, in which it is decomposed in the presence of the hydrogen, and the products from the hydrocarbon retort pass from the apparatus through the pipe *e* to the gas-holder.

Any hydrocarbon which can be reduced to a liquid and then decomposed by heat, as for example rosin and tallow, may be successfully used in the apparatus thus described, but the petroleums and crude paraffine oils obtained by the distillation of bituminous coals are preferred by the inventor. The hydrogen retort should be kept

at a temperature just high enough to vaporize a sufficient quantity of the zinc to decompose the water, and this temperature may be regulated by varying the admission of air to the ash pit of the furnace by means of a register; but with ordinary workmen it is hardly practicable to adjust the temperature with exactness; hence an excess of the zinc is vaporized and some of it passes with the hydrogen to the condenser. The products of the decomposition of water by commercial zinc are hydrogen, oxide of zinc, and some immaterial traces of other substances; the larger quantity of the oxide of zinc remains in the hydrogen retort and is removed previous to supplying a new charge of zinc; a portion of the oxide is, however, found in the condenser. The oxide is collected and washed to fit it for
371 market. In using any hydrocarbon whose chemical composition is unknown, a preliminary analysis of it should be made to determine the quantity of hydrogen, and consequently of water, required to convert all its carbon into olefiant gas; or the hydrocarbon may be decomposed in connection with a previously estimated quantity of water and the resulting gas may be tested for its quality; then from this test the proper quantity of water to be used may be determined. In commencing the process a quantity of hydrogen sufficient to drive out the atmospheric air from the apparatus should be formed before the decomposition of the hydrocarbon is commenced; then the decomposition will commence in an atmosphere of hydrogen; or, in other words, the hydrogen will be present while the products of the decomposition of the hydrocarbon are in their nascent state and at a high temperature, when an immediate recombination of them with the hydrogen results; and if the hydrogen be supplied in properly regulated quantities, as has been described, that particular combination of carbon and hydrogen known as olefiant gas is produced.

This invention is not confined to the precise apparatus represented in the accompanying drawings, as it must be evident to those skilled in the art to which it appertains that the apparatus may be varied without substantially changing its mode of operation; thus the first part of my invention may be embodied substantially by substituting in the combination some other means of supplying hydrogen in regulating quantities for the hydrogen retort and water-supplying apparatus represented in the apparatus I have described, the characteristic feature of the apparatus being to supply hydrogen in regulated quantities to a retort in which a hydrocarbon is decomposed. Moreover, the first part of the invention may be used
372 without the remainder or with any one or two of the remaining parts. On the other hand, if deemed expedient, the water may be supplied directly to the hydrogen retort by a regulating apparatus similar to that applied to the hydrocarbon feed pipe, but in this case the hydrogen retort must be of sufficient capacity to both vaporize and decompose the water; when this modification is adopted the water may be heated previous to its introduction into the retort by causing it to pass through a heated pipe. If rosin be the hydrocarbon employed the hydrocarbon reservoir V should be so arranged that it can be kept at a temperature sufficient to

maintain the rosin in a liquid form; this may be done by setting it in the brick-work in manner similar to the boiler G. In place of regulating the damper K, that controls the evaporation of the water, by hand it may be combined with a self-acting damper regulator, operated by the pressure of the steam generated in the boiler, provided the steam be generated under sufficient pressure to operate a damper regulator; in this case, however, it would be necessary to place a valve or cock in the steam pipe to prevent the steam from passing too rapidly to the hydrogen retort.

The steam boiler G should be provided with a safety valve applied to the nozzle *x*; it should also be provided with a steam-pressure gauge. As, however, the construction and application of such instruments are well known, it has not been deemed necessary to represent them in the drawings of the apparatus.

Having thus described the best mode that I am acquainted with of embodying my improvements in a working apparatus, I do not claim the separate parts which constitute my combinations, but what I claim as my invention, and desire to secure by letters patent, is—

The combination of the following devices or their equivalents, viz:

373 First. A retort in which water is decomposed to furnish hydrogen.

Second. A retort in which a fluid hydrocarbon is decomposed by heat.

Third. One or more furnaces for heating the retorts to the required temperature.

Fourth. Apparatus for supplying water in regulated quantities to the retort in which it is decomposed.

Fifth. Apparatus to supply a fluid hydrocarbon in regulated quantities to the retort in which it is decomposed.

Sixth. A connection to conduct the hydrogen from the place where it is formed to the hydrocarbon retort, the combination as a whole constituting an apparatus for manufacturing illuminating gas, and operating substantially as set forth.

I also claim the combination of the hydrogen retort with the hydrocarbon retort through the intervention of a condenser, substantially as set forth. I also claim the combination of the boiler for generating steam with the hydrogen retort through the intervention of a heating apparatus, substantially as set forth.

I also claim the combination of the hydrogen retort with the hydrocarbon retort through the intervention of a heating apparatus, substantially as set forth.

In testimony whereof I have hereunto subscribed my name.

WILLIAM ELMER.

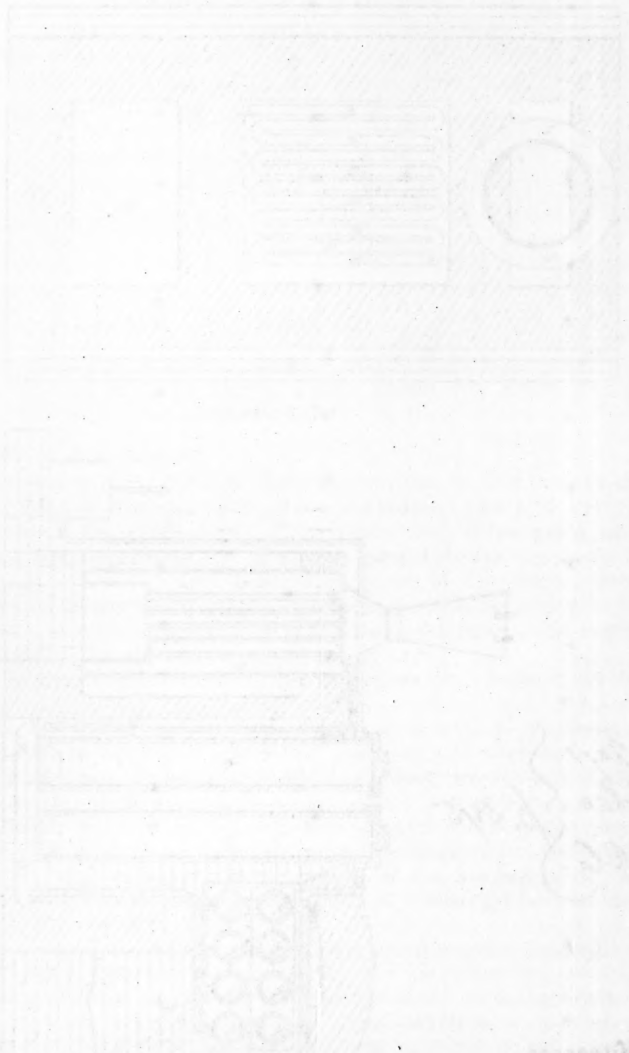
Witnesses:
E. S. RENWICK.
W. L. BENNEM.

Ex'd: E. H. M., H. M. H.

J. A. BASSETT.

Making Oil and Water Gas.

No. 35,867. Patented July 8, 1862.



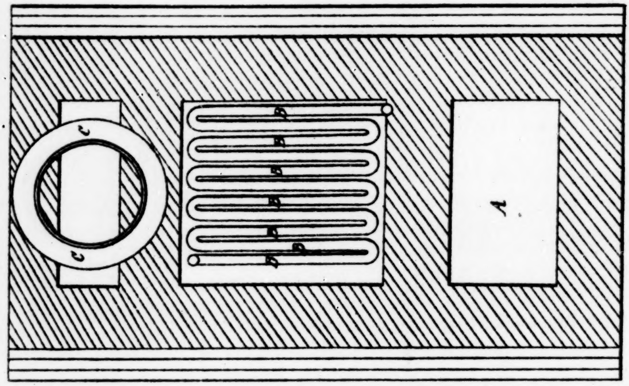
Witnesses

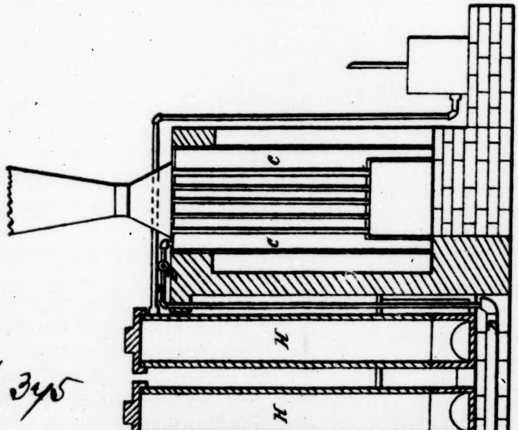
Inventor

J. A. BASSETT.

Making Oil and Water Gas.

No. 35,807. Patented July 8, 1862.





No. 2471
V.O.Co.
v
B.L.O.Co. } p. 375

Witnesses:

John Ryan
E. L. Norfolk

Inventor:

John A. Bassett

374 DEFENDANT'S EXHIBIT W.

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE.

To all persons to whom these presents shall come, Greeting:

This is to certify that the annexed is a true copy from the records of this office of the specification and drawing in the matter of the letters patent granted John A. Bassett July 8, 1862, number 35807, for improvement in making oil and water gas.

In testimony whereof I, Benj. Butterworth, Commissioner of Patents, have caused the seal of the Patent Office to be affixed this 22d day of September, in the year of our Lord one thousand eight hundred and eighty-four, and of the Independence of the United States the one hundred and ninth.

[L. S.] BENJ. BUTTERWORTH,
Commissioner.

(Here follows diagram marked p. 375.)

376 *Specification Forming Part of Letters Patent No.* 35807, *Dated July 8th*, 1862.

To all whom it may concern:

Be it known that I, John A. Basset, of Salem, in the county of Essex and State of Massachusetts, have invented a new and useful improvement in the preparation of hydrogen and other gases obtained from the decomposition of steam; and I do hereby declare the following to be a full and exact description of the same, reference being had to the accompanying drawings (making part of this specification), in which figure 1 is a vertical and figure 2 a horizontal section of the apparatus employed.

Similar letters of reference indicate corresponding parts in both views.

The nature of my invention consists in a new method of obtaining in abundance hydrogen and other gases by the thorough decomposition of steam under such conditions that the oxygen shall form a minimum of carbonic acid, the intermixture of which is injurious; and, as in most of the well-known hydrocarbon gas processes where formed in abundance, entails considerable waste of gas, expense for purification, wastes more of the carbon used in decomposition, and exerts a powerful effect in vitiating and diminishing the brilliancy of the light.

And this object I accomplish in the most perfect manner by highly heating the steam previous to its entering the decomposing retort, passing it through coils of pipe so arranged as to be heated
377 by the waste heat of the furnace up or nearly up to the temperature of the retort in which it is to be decomposed. It is obvious that if the steam is heated up to the temperature of the retort previous to its entrance that no cooling of the same will take place, and the decomposition will go on continuously with but little

production of carbonic acid. My experience in this matter has been that by keeping the carbon in the retorts at about 1,600 degrees the decomposition of the steam into hydrogen and carbonic oxide is perfect and continuous, and this object is accomplished by using the heat in various parts of the furnace, which would be otherwise wasted and lost, to raise the temperature of the steam up to a point where it will not cool the carbon below the decomposing temperature, a low temperature being the first step in the production of carbonic acid. The pipes, therefore, through which the steam passes for the purpose of superheating are progressively hotter as they approach the retort and the heat of the steam just before issuing into the retort should be about 1,500 degrees.

By superheating the steam previous to its entering the retort the formation of carbonic oxide gas goes on unintermittingly and in large proportion; and, as a water gas of proper proportions to be carbonized should be half hydrogen and half carbonic oxide, the value of this improvement is very manifest and in the preparation of hydrocarbon gas is very important.

And the object of the present invention relates specially to the means used to accomplish this result, as will be described.

To enable others skilled in the art to make and use my invention, I will proceed to describe the same with reference to the drawing annexed, which shows in section an apparatus by which it may be practically used and carried out, and also shows its application to the manufacture of hydrocarbon gas as illustrated in my patent of January 3d, 1860.

378 I place in the lower part of the furnace A a set of superheating pipes, B, in the form of a reverse coil. The steam passes into these pipes from the boiler C through the pipe D, the supply being controlled by the valve E. These superheating pipes should be made of sufficient size to allow of the expansion of the steam by reason of its increased temperature. Thus the pipe from the boiler C may be three-eighths of an inch internal diameter and the superheating pipes should be an inch and a half internal diameter. In practice I have found these proportions to work satisfactorily and properly.

These pipes are represented in the drawing to be at the bottom of the furnace directly in the main flue, but their position, as well as their number, may be varied without altering the nature of the invention.

They may be placed in any part of the furnace where heat would be otherwise lost and wasted by absorption by the brick-work and radiation, and in any number that is desired, for the more perfect the superheating the more perfect the result attained; but in practice the number and size indicated will be found sufficient and in proportion to the general arrangement and construction of the apparatus. These pipes may be made of clay or graphite or of clay and graphite mixed, or other material having little affinity for oxygen, and therefore may be more durable and may be exposed to a higher heat without injury. The walls of the furnace near the fire box may be lined with a series of these tubes, and in this way great economy of fuel will be attained.

In case these pipes are made of clay or graphite, as suggested, the
ends should be supplied with flanges for the connection with the
iron pipe of the boiler and of the retorts nearly in the same manner
as clay retorts are connected with the iron mouthpiece. The press-
ure on this apparatus never at any time exceeds ten inches
379 of water, and therefore may be used without fear of fracture
or explosion, as pipes of this size may be made to sustain a
a pressure of twenty pounds above the atmosphere with safety. If
iron pipes are used, which I have used with great success, it is obvi-
ous that cast is superior to wrought iron, as it is not attacked by
oxygen so much.

This highly-heated steam passes from these superheaters into the decomposing retorts F by the pipe G. These pipes or decomposing retorts are circular, are four inches internal diameter, and fifty inches long, and are placed so as to receive the direct heat of the fire, a high temperature being required.

The hot steam here meets the red-hot carbon and is decomposed with great rapidity. It is probable that the first product of decomposition is hydrogen and carbonic acid, which is instantly changed into carbonic oxide in presence of the incandescent charcoal. It should here be stated that no decrease of temperature of these retorts takes place.

Accurate and careful examination fails to reveal any cooling of the retorts from the time the steam is allowed to enter until the exhaustion of the charge, which is believed to be one evidence of thorough and perfect decomposition into carbonic oxide and not carbonic acid.

No interruption takes place in the decomposition; it goes on uninterruptedly, the quantity produced not varying from the first to the last, and the production of carbonic acid not increasing towards the last of the charge, as is always the case when the steam is admitted to the retort direct from the boiler in the usual hydrocarbon gas processes.

The freedom of the gas from carbonic acid may be judged of
380 from the fact that if 1,000 feet of the gas be passed through
2½ pounds of lime water a very small precipitate is made,
and works constructed according to the general plan submitted are
capable of producing upon an average at least twenty thousand feet
of gas per day. No purification by lime or any substance to remove
carbonic acid is used except water; the gas is simply washed with cold
water and passed to the gas-holder or applied to any desired use.

It is obvious that the steam, after being superheated, should be passed directly into the retorts, as, if the steam were required to traverse any long length of pipe exposed to the atmosphere, it would be cooled so as to vitiate its property for ready decomposition.

The water being decomposed the gases may be applied to any purpose desired.

In the drawing is represented two upright retorts, H, which are filled with carbon or any substance to increase the heated surface, and being supplied with the vapor of a liquid hydrocarbon in any suitable manner the gases are passed through them according to my patent of Jan. 3, 1860, producing a permanent illuminating gas; but the hydrogen and carbonic oxide, being nearly free from carbonic acid and of light specific gravity, are applicable to many useful purposes, and especially useful for saturation with hydrocarbon vapor so as to be applicable for illuminating purposes by any of the ordinary methods now in use.

Having thus fully described the nature of my invention, what I claim therein as new, and desire to secure by letters patent in the manufacture of hydrocarbon gas by a continuous process, is—

Preserving a uniform high temperature in the decomposing retort by the employment of steam superheated immediately previous to its introduction into said chamber and introduced before its temperature is materially lowered by means of apparatus constructed and arranged substantially as herein shown and described.

JOHN A. BASSET.

Witnesses
JOHN RYAN.
JAMES McGEARY.

Ex'd: E. H. M., H. M. H.

381 DEFENDANT'S EXHIBIT X.

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE.

To all persons to whom these presents shall come, Greeting:

This is to certify that the annexed is a true copy from the records of this office of the reissued letters patent granted John Howarth January 19, 1864, number 1605, for improvement in method of distilling coal, &c.

In testimony whereof I, E. M. Marble, Commissioner of Patents, have caused the seal of the Patent Office to be affixed this eleventh day of August, in the year of our Lord one thousand eight hundred and eighty-three, and of the Independence of the United States the one hundred and eighth.

[L. S.] E. M. MARBLE.

382 Reissue No. 1605.

United States of America to all to whom these letters patent shall come:

Whereas John Howarth, of Salem, Massachusetts, has alleged that he has invented a new and useful improved method of distilling coal, &c. (for which letters patent were issued to him, dated September 27, 1859, which letters having been surrendered by him, the same have been cancelled and new letters ordered to issue to him on an amended specification), which he states has not been known or used before his application; has made oath that he is a citizen of the United States; that he does verily believe that he is

Sheet 2, 2 Sheet.

J. Howarth.

Oil Still.

№ 1,605, Reissued Jan. 19, 1864.

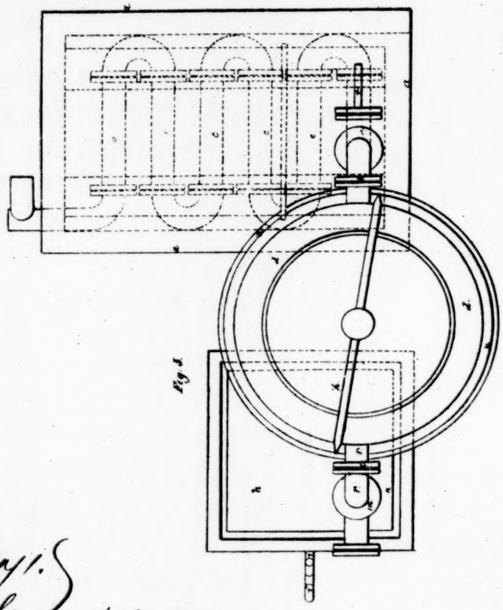


Fig 3

No. 241.
V.O.Co
B.L.O.Co.
} p. 385

Witnesses:
Joseph Garett
Albert H. Brown

Inventor:
John Howarth

J. Howarth.

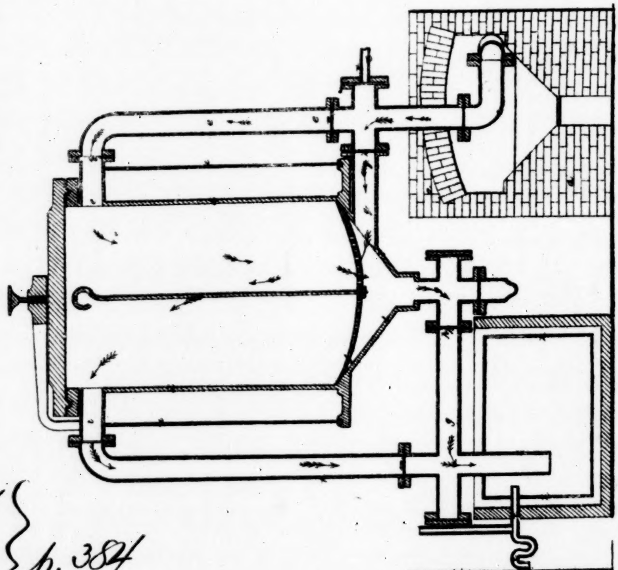
384

Sheet 1. 2 Sheets.

Oil Still.

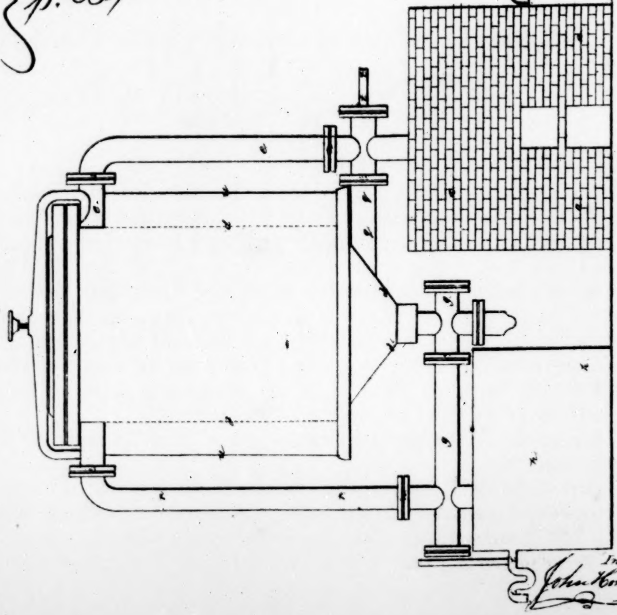
No. 1,605, Reissued Jan. 19, 1864

Fig. 2.



No. 241
V.O. Co
v.
D.L.O. Co
p. 384

Fig. 1.



Witnesses:
Joseph Garell
Albert W. Brown

Inventor:
John Howarth

the original and first inventor or discoverer of the said invention, and that the same hath not, to the best of his knowledge and belief, been previously known or used; has paid into the Treasury of the United States the sum of thirty dollars, and presented a petition to the Commissioner of Patents signifying a desire of obtaining an exclusive property in the said invention and praying that a patent may be granted for that purpose:

These are, therefore, to grant, according to law, to the said John Howarth, his heirs, administrators, or assigns, for the term of fourteen years from the twenty-seventh day of September, one thousand eight hundred and fifty-nine, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said invention, a description whereof is given in the words of the said John Howarth in the schedule hereunto annexed, and is made a part of these presents.

383 In testimony whereof I have caused these letters to be made patent, and the seal of the Patent Office has been hereunto affixed.

Given under my hand, at the city of Washington, this nineteenth day of January, in the year of our Lord one thousand eight hundred and sixty-four, and of the Independence of the United States of America the eighty-eighth.

[SEAL.] J. O. USHER,
Secretary of the Interior.

Countersigned and sealed with the seal of the Patent Office.
D. P. HOLLOWAY,
Commissioner of Patents.

(Here follow diagrams marked pp. 384 & 385.)

386 Specification forming part of Reissued Letters Patent No. 1605, dated Jan. 19, 1864.

To all persons to whom these presents shall come:

Be it known that I, John Howarth, of Salem, in the county of Essex and State of Massachusetts, have invented a new and useful method of extracting the volatile products from coal and other substances yielding pyrogenous oils and gases, and that the following description, taken in connection with the accompanying drawings hereinafter referred to, forms a full and exact specification of the same, wherein I have set forth the nature and principles of my said improvements, by which my invention may be distinguished from all others of a similar class, together with such parts as I claim and desire to have secured to me by letters patent.

The figures of the accompanying plate of drawings represent my improvements.

Figure 1, plate 1, is a side elevation of an apparatus exemplifying my improved method of extracting the volatile products of coal and other substances yielding pyrogenous oils.

387 Figure 2, plate 1, is a longitudinal vertical section.

Figure 3, plate 2, is a top view of the same.

In the process heretofore used for extracting the volatile products from coal and other carbonaceous substances it has been found that there is a certain temperature at which vaporization takes place and which temperature it has been the aim of all such processes to maintain as nearly as possible, as any excess of heat beyond this desired temperature produces gases which cannot be converted into oily vapors and are therefore lost, and any considerable diminution of heat below the proper point prevents, of course, the attainment of the desired result, viz., the producing of gases and oleaginous vapors.

But in the many kinds of apparatus heretofore used the substances from which the oil is to be extracted have been exposed either to heat in a retort, which is a roasting or baking process, or to the direct action of an ignited mass of fuel or in such manner as to allow the products of combustion to pass through and mingle with the coal or other substances to be acted upon by the heat, by either of which modes it is impossible even by the utmost care and skill to produce and maintain uniformly the exact temperature desired and no other during the entire operation, and consequently the oily vapors cannot be constantly forming.

In all these cases the temperature can be lowered only by diminishing the draft, which, of course, lessens the volume of heated currents passing through the apparatus and thereby materially checks the rapidity with which the vapors are formed.

The object of the present invention is to maintain the temperature always and during the whole operation at the vaporizing
388 point and no other, and in such a manner that the volume of
heated currents passing through the material to be acted upon shall not at any time be diminished or the rapidity with which the vapors are formed during the process suffer diminution, as a small volume of the heated currents at the proper combustion cannot, it is evident, produce such a quantity of vapors or so rapidly as a larger volume at the same temperature.

I effect the desiderata by subjecting the material from which the oleaginous vapors are to be formed to a current of heated air of the requisite temperature or to a volume of superheated steam or to both heated air and superheated steam combined, the currents of air or superheated steam being forced vertically or nearly so through the material to be acted upon under a slight pressure. By this mode the degree of heat can always be regulated and kept at the most advantageous temperature, viz., that of vaporization, without being dependent upon the fluctuations to which the various modes of heating for similar purposes have heretofore been subject and without diminishing the volume of currents passing through the apparatus, the regulating being effected, should the degree of heat become too great, which is the greatest difficulty experienced in all processes for forming oily vapors, simply by admitting cold air or steam from the boiler to mingle with the other currents being forced through the apparatus, the danger of keeping the temperature too low being but slight, as it is evident that there will be but little difficulty in

keeping the air or steam up to the proper degree of heat, as a comparatively small fire is needed for the purpose. It will be seen also that by this mode every portion of the material from which the volatile products are to be extracted is acted upon equally and at the same time by a heated current of the requisite temperature,
389 which cannot be effected where the heat is merely that of conduction by metal or by direct contact of the products of combustion with the material to be acted upon.

a a in the accompanying drawings represents a brick furnace, within which and at a suitable distance above the grate bars *b b* is placed a worm or coil of pipes, *c c*, through which steam from a boiler or atmospheric air, either separately or in combinations, is forced under slight pressure and heated in the furnace *a a* to the required temperature and then passed to the cylinder *d d* filled with the coal or other substances from which the volatile products are to be extracted. In the drawings I have shown two modes in which the heated currents may be conducted through the cylinder *d d*, viz., from the bottom to the top and from the top to the bottom, as may be most desirable.

When substances that melt in the retort are used I prefer to have the heated air or superheated steam pass into the cylinder at the bottom, but when this is not the case the current should pass in at the top.

The red arrows in figure 2 show this latter method, the air or steam passing from the heated coil of pipes *c c* up the tube *e e* and in at the top of the cylinder *d d*, whence it is forced down through the coal or substance to be acted upon, passing through the perforated plate or diaphragm *f* that sustains the charge into a pipe, *g*, that leads to the condenser *h h*. The condensed products are delivered at the bent tube *i*, and the gas at the vertical pipes i^1, and which can then be purified by any of the usual methods.

While conducting the heated current in this, it will be evident that the communications at *k*, *l*, *m* must be cut off by valves, cocks, or other suitable devices. The blue arrows in figure 2 show the manner of passing the heated currents through the cylinder
390 *d d*, and the coal or other substances therein from the bottom to the top, the communications at *k*, *l*, and *m* being, of course, opened and those at *n*, *o*, and *p* closed when the heated air or superheated steam passes from the worm *c c* into the pipe *g* up through the perforated plate *f* and cylinder *d d*, and its contents into the pipes *r r*, and then downwards into the condenser *h h*, when the products are drawn off as before at the bent tube *i*.

The superheated steam or air when at too high a temperature can quickly be reduced to the proper degree of heat without diminishing the volume of the heated current passing through the cylinder *d d* by admitting steam directly from the boiler through a pipe, *t*, or by allowing cold air to mingle with the heated currents in any proper manner; *u u* is an outer cylinder or casing holding a packing of dry clay or plaster to prevent the escape of heat from the cylinder *d d*. The coke after the process is completed can be readily removed, as it is only necessary to hoist the plate *f* by means of a hook *v*, figure 2; the cylinder *d d* is then recharged and the process goes on as before.

Having thus described my improvements I shall state my claims as follows:

What I claim as my invention and desire to have secured to me by letters patent is distilling coal or other carbonaceous substances for the production of oils, gases, vapors, etc., by passing through the material to be acted upon a current of superheated steam in one body in a vertical plane, or nearly so, through an upright retort—that is, so that a body of superheated steam shall come in contact with every portion of the said material as set forth.

I also claim forming oleaginous vapors from coal or other substances yielding pyrogenous oils by passing through the material to be acted upon air combined with superheated steam, substantially in the manner and for the purposes set forth. I also claim passing through the material to be acted upon superheated steam in combination with steam direct from the boiler for the purpose of regulating the temperature as set forth.

JOHN HOWARTH.

Witnesses:
ALBERT W. BROWN.
FREDERIC A. SAYER.

Ex'd: E. S. S., C. F.

391 DEFENDANT'S EXHIBIT Y.

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE.

To all persons to whom these presents shall come, Greeting:

This is to certify that the annexed is a true copy from the records of this office of the letters patent granted M. Werk October 5, 1858, number 21711, for improvement in apparatus for manufacturing fatty acids.

In testimony whereof I, E. M. Marble, Commissioner of Patents, have caused the seal of the Patent Office to be affixed this eleventh day of August, in the year of our Lord one thousand eight hundred and eighty-three, and of the Independence of the United States the one hundred and eighth.

[L. S.] E. M. MARBLE,
Commissioner.

(Here follows diagram marked p. 392.)

393 *Specification Forming Part of Letters Patent No.* 21711, *Dated October 5th*, 1858.

To all whom it may concern:

Be it known that I, M. Werk, of the city of Cincinnati, in the county of Hamilton and State of Ohio, have invented a new and improved process of manufacturing fat acids, and I do hereby de-

M. WERK.

Decomposing Fats.

No. 21,711. Patented Oct. 5, 1858.

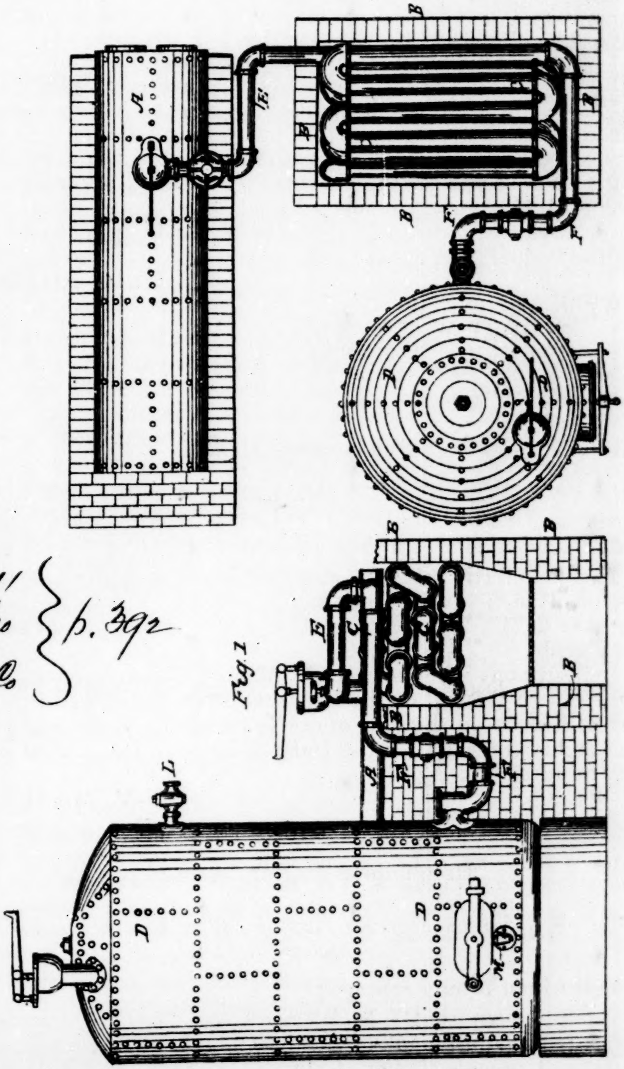


Fig. 1

No. 241
V.O. Co
v.
B.L.O. Co
p. 392

clare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, making a part of this specification, in which—

Figure 1 is an elevation of the apparatus employed in performing my invention.

Figure 2 is a plan of the same.

Similar letters of reference indicate corresponding parts of both figures.

394 My invention is based upon the discovery I have made that fatty or oleaginous bodies, when subjected directly to the action of superheated steam, are decomposed into free fat acids and glycerine; and my invention consists in the practical application of this discovery.

To enable others to make and use my invention I will proceed to describe the manner in which it is performed and the apparatus I employ in the process represented in the drawing.

The fatty or oleaginous body to be treated is placed in a strong close vessel into which the superheated steam is admitted and in which the latter is allowed to act upon the body for a suitable length of time, which may be determined by practice or by tapping the vessel from time to time to analyze the contents. The superheated steam alone of a temperature of from 800 degrees to 900 degrees Fahrenheit will effect the decomposition, but acids or alkalies may be used in combination with the superheated steam to render so high a temperature unnecessary, and I find by experiment that by using about seven pounds of lime and fifty pounds of water in the form of milk of lime for every 100 pounds of fatty or oleaginous matter a temperature of from 400° Fahrenheit to 530° Fahrenheit will be sufficient for the superheated steam.

In the accompanying drawing, D is the vessel in which the decomposition is effected, furnished with a cock, L, near the top to admit the body to be treated, which should be first melted; A is a boiler for generating steam, and B is a superheating furnace containing a coil, C, to which the steam pipe E from the boiler is connected and from which a pipe, F, leads to the vessel D and circulates within the vessel in the form of a coil, which is perforated to admit the steam in numerous small streams.

395 The operation as generally conducted in the said apparatus is as follows: The tank is filled to a suitable height through the cock L, while the pipes E and F are closed by cocks provided for that purpose; then before the fire is lighted in the superheating furnace B steam is admitted from the boiler to the vessel D, which is kept at a temperature of about 212° Fahrenheit for about from fifteen to twenty minutes, and then the milk of lime, if used, is introduced through the cock L or another cock provided for that purpose. The cock is then closed and the fire lighted in the furnace B to superheat the steam, and the contents of the vessel D are subjected to the action of the steam for about from three to five hours. The contents of the vessel D are drawn through a cock, M, at or near the bottom after the decomposition is complete.

The heat required for the superheated steam will be greater in proportion as less lime is used.

The advantage of the use of superheated steam as above described in the decomposition of fatty or oleaginous bodies consists principally in obviating the danger of burning the vessel or its contents, which danger always exists when the decomposing vessel is subjected to the direct action of fire.

What I claim as my invention and desire to secure by letters patent is—

The manufacture of fat acids by subjecting fatty or oleaginous bodies to the direct action of superheated steam either with or without the use of other agents, substantially as herein described.

M. WERK.

Witnesses:
C. F. HANSELMAN.
W. F. HANSELMAN.

Ex'd: M. McK., J. G. H.

(Here follows diagram marked p. 396.)

397 *Opinion.*

United States Circuit Court, Northern District of New York.

VACUUM OIL COMPANY *vs.* BUFFALO LUBRICATING OIL CO.

WALLACE, *J.:*

For the reasons stated orally at the hearing of this cause the second and twelfth claims of the patent in suit (No. 68426, granted Sept. 3, 1867, to Hiram B. Everest, assigned to complainant) are clearly void for want of novelty. Inasmuch as no disclaimer has been filed, it is unnecessary to consider the validity of the other claims. After the term of a patent has expired it is too late to file a disclaimer. The suit cannot, therefore, be maintained, and the bill is dismissed.

(Indorsed:) 3748. United States circuit court, northern district of New York. Vacuum Oil Co. *v.* Buffalo Lubricating Oil Co. Opinion, Wallace, J. Filed Mar. 20, 1885. W. S. Doolittle, clerk.

398 *Appeal.*

United States Circuit Court in and for the Second Circuit and Northern District of New York. In Equity.

THE VACUUM OIL COMPANY
vs. } 3748.
BUFFALO LUBRICATING OIL COMPANY, Limited.

To the honorable the Supreme Court of the United States:

The appeal of the Vacuum Oil Company, the above-named complainant and appellant, respectfully showeth:

That upon the 25th day of April, 1882, the above-named complainant filed its bill in the circuit court of the United States for the

DEFENDANT'S EXHIBIT "Z"

Fig. 1.

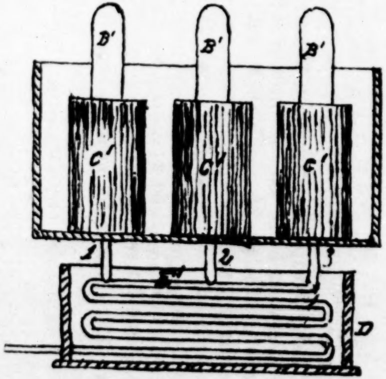
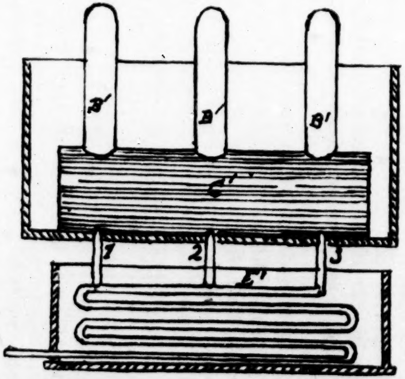


Fig. 2.



~ Wilhelm's Duplicate of Osgood's Sketch ~

No. 271
V.O.Co.
" B.L.O.Co. } p. 396.

northern district of New York against the above-named defendant, alleging that one Hiram B. Everest was the first and original inventor of an improvement in apparatus for distilling petroleum, not known or used before and not in public use or on sale for more than two years prior to his application for a patent therefor; and that on or about the 17th day of August, 1867, the said Hiram B. Everest, having made due application for letters patent for said improvement, duly assigned on said last-mentioned day all his right, title, and interest in and to said invention to the complainant and appellant; and that thereafter, to wit, on the 3d day of September, 1867, letters patent of the United States numbered 68426 were duly issued to said complainant and appellant, as assignee of said Everest, whereby there was secured to said complainant for the term of seventeen years from the said third day of September, 1867, the full and exclusive right of making, using, and vending the said improvement;
and alleging further in the said bill that the said defendant
399 had infringed upon the exclusive right of the complainant
and appellant as secured to it by said letters patent, and praying for a decree and injunction and an account.

And the complainant and appellant further shows unto your honors that the answer of this defendant was duly filed on the 2nd day of October, 1882, denying the infringement alleged in said bill, and that the said Hiram B. Everest was the first and original inventor of the improvement in the said letters patent described.

And this complainant and appellant further shows unto your honors that depositions of witnesses on both sides were duly taken in the said case, and that at a term of the United States circuit court for said district, held at Canandaigua, N. Y., in June, 1884, the cause was moved for final hearing before his honor Alfred C. Coxe by the complainant; that thereupon a motion was made on the part of the defendant for leave to reopen its case for the purpose of giving further expert testimony and to postpone the hearing of the cause until the taking of said testimony; that the defendant's motion to reopen was granted, the testimony duly taken, and that at a term of the United States circuit court for said district, held at Albany, N. Y., in January, 1885, this cause was heard on the pleadings therein by his honor William J. Wallace, who thereupon at the hearing made a decretal order dismissing the complainant's bill with costs on the ground that, the patent having in the meantime expired and the bill containing no allegation of damages and loss of profits, the
court had no jurisdiction of the cause.

400 The complainant and appellant further shows unto your
honors that thereafter, to wit, on the 30th day of January, 1885, the complainant filed a petition for rehearing and for leave to amend the bill by inserting allegations of damages and loss of profits; that at a term of the United States circuit court for said district, held at Utica, N. Y., in March, 1885, the complainant moved for a rehearing upon said petition, and that the motion was granted and an order made by his honor William J. Wallace that the bill be amended by inserting the allegations of damage and loss of profits prayed in said petition, and that the said cause, upon the amended

bill and the pleadings and proofs be reheard forthwith; that thereupon and on the 17th day of March, 1885, said cause was heard as aforesaid and a final decree made dismissing the bill with costs on the ground that, the patents having expired, and the second and twelfth claims of said patent being determined on said hearing to be void for want of novelty, it was unnecessary to consider the remaining twelve claims, the whole patent being null and void, because after expiration of the patent it was impossible to comply with the statutory provisions as to filing disclaimer.

That on the 30th day of March, 1885, the costs were taxed, decree enrolled, and judgment entered for three hundred and seventy dollars and twelve cents ($370.12).

Wherefore this appellant appeals from the whole of said decree of said circuit court of the United States and respectfully prays that the decree of the said circuit court and the bill, answer, pleadings, depositions, evidence, and proceedings in the said cause 401 may be sent to the Supreme Court of the United States without delay, and that the said Supreme Court will proceed to hear the said cause anew, and that the said decree of the circuit court and every part thereof may be reversed and such decree made as to the said Supreme Court shall seem just.

Dated Ap'l 6, 1885.

THEODORE BACON,
Solicitor for said Appellants.

ROCHESTER, N. Y.

The appeal is allowed as prayed, citation to issue, bond having been approved.

Dated April 7th, 1885.

WM. J. WALLACE,
Circuit Judge.

(Indorsed:) 3748. U. S. circuit court, northern district of N. Y. The Vacuum Oil Company, appellant, *vs.* Buffalo Lubricating Oil Company, Limited, respondent. Appeal. Theodore Bacon, att'y for appellant. Filed Apr. 8, 1885. W. S. Doolittle, clerk.

402 *Bond on Appeal.*

United States Circuit Court, Northern District of New York. In Equity.

THE VACUUM OIL COMPANY
vs. } No. 3748.
BUFFALO LUBRICATING OIL COMPANY, Limited.

Know all men by these presents that we, Draper Stone, of Pittsford, Monroe county, N. Y., and Wendell M. Smith, of Rochester, Monroe county, N. Y., are held and firmly bound unto the Buffalo Lubricating Oil —, Limited, of Buffalo, N. Y., in the sum of seven hundred and forty-five dollars ($745), to be paid to the Buffalo Lubricating Oil Company, Limited, its successors or assigns; to which payment, well and truly to be made, we bind ourselves and each of us, jointly and severally, and our and each of our heirs, executors, and administrators, firmly by these presents.

Sealed with our seals. Dated the 6th day of April, 1885.

Whereas the above-named The Vacuum Oil Company hath taken an appeal to the Supreme Court of the United States to reverse the decree rendered in the above-entitled action by the circuit court of the United States for the northern district of New York:

Now, therefore, the condition of this obligation is such that if the above-named The Vacuum Oil Company shall prosecute its said appeal to effect and answer all costs and damages if it shall fail
403 to make good its plea, then this obligation shall be void; otherwise to remain in full force and virtue.

DRAPER STONE. [SEAL.]
WENDELL M. SMITH. [SEAL.]

NORTHERN DISTRICT OF NEW YORK, } ss:
Monroe County,

On this 6th day of April, 1885, before me, the subscriber, personally came Draper Stone and Wendell M. Smith, to me known to be the same persons described in and who executed the foregoing bond, and severally acknowledged that they executed the same.

[L. S.] A. L. MABBETT,
Notary Public.

NORTHERN DISTRICT OF NEW YORK, } ss:
Monroe County,

Draper Stone and Wendell M. Smith, being severally duly sworn, each for himself says: I am a citizen of the United States and freeholder of the State of New York; I am worth, in property not exempt from execution, the sum of seven hundred and forty-five dollars ($745.00) over all my just debts and liabilities.

DRAPER STONE.
WENDELL M. SMITH.

Subscribed and sworn to before me this 6th day of April, 1885.

[L. S.] A. L. MABBETT,
Notary Public.

(Indorsed:) 3748. U. S. circuit court, northern district N. Y. The Vacuum Oil Company, appellant, *vs.* Buffalo Lubricating Oil Company, Limited, respondent. Bond on appeal. The-
404 odore Bacon, att'y for appellant.

The within bond is approved as to form and sufficiency to stay execution.

Dated Ap'l 7th, 1885.

WM. J. WALLACE.

Filed Apr. 8, 1885.

W. S. DOOLITTLE, *Clerk.*

405 *Citation & Proof of Service.*

NORTHERN DISTRICT OF NEW YORK, } ss:
County of Monroe, }

United States Circuit Court, Northern District of New York.

THE VACUUM OIL COMPANY, Appellant,

vs.

BUFFALO LUBRICATING OIL COMPANY, Limited, Respondent.

Fred. L. King, being duly sworn, saith that he is more than twenty-one years of age; that at Buffalo, N. Y., on the 9th day of April, 1885, he served the annexed citation on the above-named respondent, The Buffalo Lubricating Oil Company, Limited, and on James A. Allen, Esq., counsel for said respondent, by showing the same to Charles B. Matthews, president of said Buffalo Lubricating Oil Company, Limited, and to said James A. Allen, and at the same time delivering to and leaving with each of them personally a true copy thereof; and this deponent further saith that he served on said Charles B. Matthews and on said James A. Allen, on said abovementioned day, a copy of the appeal and a copy of the bond on appeal filed in this cause with the clerk of the circuit court in and for the northern district of New York by delivering to and leaving with each of them personally a copy of said appeal and of said bond; and this deponent further saith that on the 8th day of April, 1885, he left said original appeal and said original bond on 406 appeal in the clerk's office of the circuit court aforesaid, to be filed therein.

FRED L. KING.

Subscribed and sworn to before me this 10th day of April, 1885.

{ Seal of Alonzo L. Mabbett, Notary Public, Monroe County, Rochester, N. Y. }

A. L. MABBETT,
Notary Public.

407 *Citation.*

By the Honorable William J. Wallace, judge of the circuit court of the United States for the northern district of New York.

To Buffalo Lubricating Oil Company, Limited:

Whereas the Vacuum Oil Company has lately appealed to the Supreme Court of the United States from a decree lately rendered in the circuit court of the United States for the northern district of New York, made in favor of you, the said Buffalo Lubricating Oil Company, Limited, and has filed the security required by law, you are, therefore, hereby cited to appear before the said Supreme Court, at the city of Washington, at the next term of said Court, on the second Monday of October, A. D. 1885, to do and receive what may appertain to justice to be done in the premises.

Given under my hand the 7th day of April, in the year of our Lord one thousand eight hundred and eighty-five.

WM. J. WALLACE,
Circuit Judge.

[Endorsed :] 3748. U. S. circuit court, northern dist. of N. Y. The Vacuum Oil Company, appellant, *vs.* Buffalo Lubricating Oil Company, Limited, respondent. Citation. Theodore Bacon, att'y for appellant.

[Stamped :] U. S. circuit court, N. D. of N. Y. Filed Apr. 11, 1885. W. S. Doolittle, clerk. See admission of service on back. D. S. N.

I admit due service of the within citation and also service of copies of the bond and petition of appeal.

Dated Ap'l 9, 1885.

CORLETT & HATCH,
Solicitors for Defendant.

408 UNITED STATES OF AMERICA,
Northern District of New York, } *ss:*

I, William S. Doolittle, clerk of the circuit court of the United States of America for the northern district of New York, in the second circuit, do hereby certify that the foregoing pages, numbered from 1 to 407, inclusive, contain a true and complete transcript of the record and proceedings had in said court in the case of the Vacuum Oil Company *versus* Buffalo Lubricating Oil Company, Limited, as the same remain of record and on file in said office.

In testimony whereof I have caused the seal of the said court to be hereunto affixed, at the city of Utica, in the northern district of New York, in the second circuit, this 2nd day of May, in the year of our Lord one thousand eight hundred and eighty-five, and of the Independence of the said United States the one hundred and ninth.

[Seal of the U. S. Circuit Court, Northern District N. Y.]

W. S. DOOLITTLE, *Clerk.*

Endorsed on cover: N. New York C. C. U. S. No. 271. The Vacuum Oil Company, appellant, *vs.* The Buffalo Lubricating Oil Company (Limited). Filed August 13, 1885.

[illegible]
FILED
APR [illegible]
JAMES H. McKEN[illegible]

SUPREME COURT
OF THE UNITED STATES.

October Term, 1887.

VACUUM OIL COMPANY,
Appellant,
against
THE BUFFALO LUBRICATING OIL COMPANY, LIMITED,
Appellee.

No. 271.

ARGUMENT FOR APPELLANT.

APPEAL FROM THE CIRCUIT COURT OF THE UNITED STATES FOR THE NORTHERN DISTRICT OF NEW YORK.

WILLIAM F. COGSWELL,
Counsel for Appellant,
ROCHESTER, N. Y.

Charles Mann, Printer, Elm Park, Rochester, N. Y.

SUPREME COURT

OF THE UNITED STATES.

October Term, 1887. Number 271.

VACUUM OIL COMPANY,
Appellant,
against

THE BUFFALO LUBRICATING OIL COMPANY, LIMITED.

Appeal from the Circuit Court of the United States of the Northern District of New York, from a Decree Dismissing the Complainant's Bill.

HISTORY OF THE CASE.

The plaintiff filed its bill of complaint against the defendant on the 25th day of April, 1882, upon a patent issued on the 3rd day of September, 1867, for an improvement in apparatus for distilling petroleum, praying for an injunction, an account of profits and for damages. The defendant's answer was filed October 2, 1882, and the case put at issue by replication, filed December 1st of the same year. The complainant's *prima facie* case was closed on the 28th day of February, 1883 (page 49 of the record). The defendant introduced a large number of exhibits, but examined only one witness, its expert. Its proofs were closed on the 14th of August, 1883, and the complainant given until the 1st day of December in the same year, in which to put in its rebutting proofs. They were not in fact then taken, but were commenced on the 25th of January, 1884, and continued from time to time by agreement, until the 2nd day of June, 1884, on which day the proofs were closed (page 93). On the 7th of June, 1884, the defendant moved for an order enlarging the time to take proofs (page 12), which, on the 17th of June, 1884, was granted (page 15). In October of that year the defendant's expert witness was recalled and his examination commenced, which was concluded on the 12th of December; and on the 22nd of December the complainant's expert witness was recalled and his examination commenced and concluded on the same day. The case came on for hearing on the 23rd of January, 1885, when the bill was dismissed on the ground that the letters patent named in the complaint had expired, and that the bill did not state a cause of action for an account (page 60). The plaintiff filed a motion for a re-hearing and for leave to amend its bill by adding an averment as to an account, which motion was granted and the cause ordered for re-hearing forthwith (page 23). The cause was accordingly re-heard upon the bill as amended and the proofs already taken, and on the 17th of March, 1885, the bill was again dismissed on the ground that two of the claims of the patent in suit were void for want of novelty; that as no disclaimer has been filed, it was unnecessary to consider the validity of the other claims and that, as the term of the patent had expired, it was too late to file a disclaimer, and the suit could not, therefore, be maintained (see page 24 for the decree dismissing the bill, and page 226 for the opinion).

The grounds for the dismissal of the original and amended bill were created by the defendant's motion to enlarge the time of taking testimony, since the cause was in readiness for hearing at the June Term, 1884, and the patent did not expire until September. If the case had been heard and decided in the usual course of procedure the plaintiff would have been entitled to an injunction, and could have filed a disclaimer.

THE ERROR IN THE REASONS ASSIGNED FOR THE DECREE.

It is submitted that the Circuit Judge fell into very palpable error in dismissing the bill upon the ground assigned by him. The patent contains, as numbered, fourteen claims; two of those claims, the second and the twelfth, the judge holds are void. No disclaimer had been filed as to those claims. One, the second, the plaintiff insisted and still insists was valid and was infringed; the other, the twelfth, was uninfringed, but its validity was insisted upon.

The judge dismissed the bill on the ground that no disclaimer has been filed as to these, and the patent having expired it was too late to file a disclaimer, and that, therefore, the suit could not be maintained.

The rule in cases where a part of the claims in a patent are involved, as provided by the statute, is, that if there is a valid, material part of the patent infringed the plaintiff may still recover, unless it appears that such invalid claim was fraudulently inserted in the patent, or unless the patentee has unreasonably neglected or delayed to enter a disclaimer. Except in the last-mentioned case the omission to file a disclaimer merely affects the question of costs.

Revised Statutes, Sections 4,917, 4,922.
Patent Acts of 1870, Sections 54 and 60.

For convenience I print so much of the sections as is material. The section first cited provides that,—

"Whenever, through inadvertence, accident or mis- "take, and without any fraudulent or deceptive in- "tention, a patentee has claimed more than that of "which he was the original, or first inventor, or dis- "coverer, his patent shall be valid for all that part "which is truly and justly his own, provided the same is "a material or substantial part of the thing patented. "And such a patentee, his heirs or assigns, whether of "the whole or any sectional interest therein, may on "payment of the fee required by law, make disclaimer "of such parts of the thing patented as he shall not "choose to claim or to hold by virtue of the patent or "assignment, stating therein the extent of his interest "in such patent. * * * But no such disclaimer "shall affect any action pending at the time of its be- "ing filed, except so far as may relate to the question of "unreasonable neglect or delay in filing it."

The section second cited provides:

"Whenever, through inadvertence, accident or mis- "take, and without any willful default or intent to de- "fraud or mislead the public, a patentee has in his "specification claimed to be the original and first in- "ventor or discoverer of any material or substantial "part of the thing patented, of which he was not the "original inventor or discoverer, every such patentee, "his executors, administrators or assigns, whether of "the whole or of any sectional interest in the patent, "may maintain a suit at law or in equity for the in- "fringement of any part thereof which was *bona fide* "his own, if it is a material and substantial part of the "thing patented, and definitely distinguishable from "the parts claimed without right, notwithstanding the "specifications may embrace more than that of which "the patentee was the first inventor or discoverer. "But in every such case in which a judgement or de- "cree shall be rendered for the plaintiff no costs shall "be recovered unless the proper disclaimer has been "entered at the Patent Office before the commence- "ment of the suit. But no patentee shall be entitled "to the benefits of this section if he has unreasonably "neglected or delayed to enter a disclaimer."

Whether a disclaimer should be filed before a decree is allowed, where it appears by the decision of the Court that some of the claims are invalid, is a question upon which the rulings of the circuits have not been quite uniform, and which has not been decided in this Court. The matter is sufficiently referred to in Walker on Patents, section 209. It would seem from what is said in the case of *O'Reilly vs. Morse*, 15th Howard, on page 121 of the Report, that it was not necessary. But as the provision for the filing of a disclaimer is remedial, as is said in the case cited, it is quite clear that if it is impossible to file a disclaimer, the plaintiff is entitled to the benefit of the statute without filing such disclaimer. Indeed, it is submitted that without the statute, where the valid and invalid parts of a patent were severable, the plaintiff could maintain his action for an infringement of the valid parts. But it is unnecessary to discuss this question, since it is expressly decided in this Court in the case of *The Yale Lock Co. vs. Sargent*, 117 U. S. Reports, page 536. In that case Sargent brought his action against the company upon a re-issued patent, the original of which was issued August 28, 1866. He prevailed at the Circuit and had a decree for an injunction and damages, with costs. The company appealed to this Court, and long before the decision the patent had expired. This Court held that one of the claims was invalid, and no disclaimer was filed. The Court said, on page 554:

"There can be no doubt that claim 4 of the Re-issue "was invalid, as an unlawful extension of the original "patent on an application for the re-issue, was filed "more than five years after the original patent was "granted. But the patent has expired; therefore no "disclaimer can now be filed. There was no unreason-"able delay in filing a disclaimer, as the validity of "Claim 4 was sanctioned by the Commissioner of "Patents in granting the re-issue, and this suit was "commenced in July, 1872, and the claim was not "held invalid by the Circuit Court. Both the inter-"locutory and final decrees having been entered before "the decisions of this Court, at the October Term, "1881, on the subject of the re-issued patents, were "made, the result, therefore, is that the decree below "must be reversed as to the award of costs and af-"firmed in all other respects."

That case establishes that the grounds upon which the Judge at the Circuit dismissed the bill were not well taken, and that if it shall be found that some material part of the patent is valid and has been infringed, the decree should be reversed. We are thus left to a discussion of the question of the validity of the plaintiff's patent and its infringement, without the aid of any examination of the question in the court below. As to the

INFRINGEMENT.

I take up this subject first, although not in the natural order of presenting a case, because there is really no question in regard to it. The defendant uses but one retort and so does not infringe the first claim of the patent; but in other respects he duplicates the plaintiff's device, and so infringes the second, third, fourth, fifth, seventh, and eighth claims. A model of the defendant's mechanism is used to illustrate the plaintiff's device. We are thus brought to a consideraiton of

THE PLAINTIFF'S INVENTION AND THE VALIDITY OF THE PATENT.

The object sought to be accomplished by the invention is the separation of crude petroleum into naptha, illuminating oil and a heavy lubricating oil, and disengaging all of these products from the worthless vapors or waste in a single operation. The process of distillation by which the more volatile parts are thrown off can only be carried on at a low temperature, as otherwise the residuum is liable to be burned or scorched and spoiled for use. It is necessary, therefore, that the process should be carried on in a vacuum in which vaporization can be accomplished at a much lower temperature than under the pressure of the atmosphere. The device described in the patent, disregarding the secondary retort which the defendant does not use and which is not necessary to use for the accomplishment of the purpose sought, consists of a boiler placed over its own furnace from which the steam passes over to and through a series of pipes set in the super-heating furnace constructed by the side of the boiler furnace, and from thence to a horizontal, cylindrical retort, through which it is conducted by another series of pipes. From the retort a series of conduits convey the vapors raised by the heat in the retort into a large condenser or condensers located in a tank continually supplied with cold water, for the purpose of condensing the vapors thus passing over. From and underneath this condenser and for the better accomplishment of the purpose of condensation, proceeds a coil of pipe, or worm, which discharges the naptha and oil, the result of the condensation of the vapor, into a receiver or receivers placed underneath the tank holding the condensers. Into the top of the receiver or receivers is inserted the end of an exhaust pump which is operated in the usual manner, and by which the uncondensed, worthless vapors are removed, while into the bottom of the receiver or receivers is inserted a stop-cock or cocks by means of which the naptha and the oil produced by the condensation, is drawn off into receptacles, for use or for further treatment, as may be required. The heavy or lubricating oil left after the process of distillation has proceeded to the proper point, is drawn directly from the retort. The products of combustion and waste heat of the super-heated furnace are conveyed into the boiler furnace and assist in the process of generating steam.

The retort being charged with petroleum to the proper extent, the exhaust pump is put in operation, and the air in the retort exhausted. The steam in the pipes in the retort will very soon cause the oleaginous vapors to arise from the petroleum, which in turn are brought over by the operation of the exhaust pump, through the conduits, into the condenser, where being subject to the effect of the cold water, the valuable parts are once more condensed into the form of at first naptha and afterwards illuminating oil, and discharged into the receivers, and drawn off by means of stop-cocks instead of passing out through the pump, while the valueless vapors only are carried off by the exhaust pump and wasted. If the pump were attached to condensing pipes which proceed directly to the retort, there would be danger that the pump would bring over the oil from the retort with the vapor and before the process of separation was completed, thus rendering the oil so carried over unfit for the purposes of illumination, and the so-called capacious condenser or condensers are interposed between the pump and the retort to break the force of the pump and avoid this result. The series of conduits from the retort to the condensers are to give a more direct communication between the two receptacles, and a freer discharge of the vaporized oil.

THE CLAIMS.

The first claim is for a combination of two or more retorts, and as the defendant uses but one, is not infringed and so need not be further considered. The second claim is for the construction of a horizontal, elongated, cylindrical or ellipitical vacuum retort arranged and operated in the manner and for the purpose in the patent set forth. The third claim is for connecting the retorts of a vacuum still with the condenser or condensers, by several conduits so as to distribute the exhaust in the retort and thus prevent drawing the oil over, at the same time facilitating the escape of the vapor. The fourth claim is for combining the condenser with the retort and the condensing coil so that the condenser will serve as a check, to diminish the direct action of the exhaust pump upon the oil in the retort. The fifth claim is placing the receiving vessels in such a position as to allow the distilled oil to be discharged by its own gravity and without passing through the pump. The seventh claim is for the use in combination with the vacuum still and a steam generator, of an independent super-heating furnace. The eighth claim is for the construction of a super-heating furnace in combination with a steam boiler. The thirteenth claim is for a combination of the steam generator, super-heating furnace and vacuum apparatus, as a whole; and the fourteenth claim is for the process of the separation of petroleum into its constituent parts.

After the plaintiff had introduced its patent and proved the infringement, the defendant, at page 109, took up the case and introduced twenty-five different patents, some English, mostly American, and thereupon called its so-called expert witness, whose original examination, commencing on July the 11th, 1883, extends from page 113 to page 131, inclusive. On January 25th, 1884, the plaintiff called its expert witness whose testimony extends from page 50 to the top of page 93, inclusive. On October 15, 1884, the defendant re-called its expert in rebuttal of the testimony of the plaintiff's expert, and his testimony extends from page 132 to page 137, inclusive. The plaintiff thereupon re-called its expert on December 22, 1884, in rejoinder to the defendant's expert and his testimony extends from the bottom of page 93 to page 100, inclusive.

As to all this expert evidence I may say at once that it amounts to nothing more or less than an argument on the one side and the other, and not a particularly good argument either upon either side, which argument is entitled to no additional weight from the fact that it is given in the form of testimony. A very large part of the testimony of defendant's witness is in giving his construction of different parts of the patent, and its claims, and however expert he may be in mechanics, he certainly is not specially expert in the science of law, and his opinion, therefore, is not unnaturally found to be erroneous. The Court will have to take up the different patents relied upon by the defendant as anticipating the plaintiff's invention, and determine that question for itself.

THE SECOND CLAIM.

The defendant insists that the plaintiff claims broadly "a vacuum retort having a cylindrical form, and arranged with its longitudinal axis in a horizontal position." The plaintiff, on the contrary, insists that this claim is for such a retort arranged and operating in the manner set forth in the patent, or, in other words, for such a retort in combination with the other parts of the device as described. If the claim is as broad as the defendant insists, I should not undertake to defend it; because, whether anticipated by any particular device or not, I should not suppose that having a cylinder standing upon end, with its axis perpendicular, the changing of its position so that its axis would be horizontal would constitute invention. Having set up his man of straw, the defendant's expert proceeds to demolish it by reference to numerous patents, which, as he says, show elongated retorts arranged with their axis longitudinal or horizontal. As I have intimated, this does not touch the question.

The witness, however, makes certain references which I will consider: The first is to the Ewing patent, Exhibit P, the description of which is upon page 193. This patent is for a product produced in the way described therein, and it is to be construed in connection with his patent for an apparatus, described on page 195. It is probably sufficient to say of this patent, Exhibit P, that the vapor produced by the heating of the oil passes over from the retort *A* into the condenser *C*, where the condensation is caused by the direct injection of cold water through the pipe *D* into the vapor so produced. From this condenser the oil and the water and any vapors that may not be condensed are drawn by a pipe *F* connected with a pump, and thus commingled discharge into some receptacle, what, is not shown by the description in the first-mentioned patent, but by reference to the second patent, to which the first refers, it appears (page 197) that "the condensed oil and the water pass off together through the pipes *LL* into the tank *M*, where the oil rises on top and is easily separated. The difference between an apparatus producing such a result and one, one of whose purposes is to disengage and waste the worthless vapors from the condensed oil, does not seem to require further comment. But it should be further noticed that there is but one conduit between the retort *A* and the condenser *C*. This the defendant's witness admits, but says that the retort is capable of being provided with several conduits if desired. The defendant's position assumes that Mr. Everest, who took out the plaintiff's patent, sought and the Patent Office granted him a patent on the device shown in a prior patent which he already owned. The plaintiff's patent was granted September 3d, 1867, and the two Ewing patents to Ewing & Everest, assignees, Exhibit P and Q, were granted one July 31st, 1866, and the other September 11th, 1866.

The next reference is to a patent issued to Tait & Davis, defendant's Exhibit C, specification of which is found at page 154. This is a totally different device from the plaintiff's. It is a fire-still; no means are provided for producing a vacuum and the whole arrangement for separating the worthless from the valuable product is wanting.

The next is the Higham patent, Exhibit B, found at page 152 of the records. This is a direct fire-still, the vapors from the retort pass over into a worm *D*, which passes through a condensing tank connecting directly with the pump which is used at the beginning of the operation only. The enlarged condenser, the continuous exhaust, the separation of the worthless from the valuable are wanting in this device as well as steam heating.

The next reference is to the Reese patent, Exhibit A, page 148. This apparatus is a direct fire-still with the retort divided by partitions, so that the several conduits have no operation; there is capacious condenser, no exhaust pump or other means of producing a vacuum.

The next reference is to the Lugo patent, Exhibit O, page 190, which is the reverse of the plaintiff's device. It is a fire-still with no condenser except the ordinary worm, the pump is used for the purpose of drawing air into the retort. It also draws the vapors from the retort and the oil from the worm and discharges them into a common receptacle. Separation is not only not sought, but is rendered impossible.

The next reference is to Horner's patent, Exhibit J, the description of which is on page 176. The drawing is misplaced and faces page 173. This is a direct fire-still for extracting oil from coal, shale and other minerals. The vapor passes from the retort to a condenser not shown in the drawings nor described in the patent, thence to a worm in a cooler, by which the oil is cooled; thence into a separating chamber, not shown in the drawings nor described in the specifications, where the oil is separated from the water and the condensed steam, and drawn off. There is no pump, no exhaust, no vacuum. The invention was the mixture of cream of tartar, common salt and a slake lime for the purpose of condensing the oleaginous vapor and throwing off the surplus vapor.

The next reference is to the Vander Wyde patent. The drawing will be found facing page 174; the specifications begins at page 173. The drawings and specification of this patent are very obscure, but it is clear enough that it is entirely unlike the plaintiff's invention.

It is a direct fire-still with no capacious condenser and no effective vacuum, the discharge being returned to the still.

THE THIRD AND FOURTH CLAIMS.

As the fourth claim is more comprehensive than the third and includes it, and as the defendant in violating the fourth necessarily violates the third, I shall consider these claims together. The defendant's expert witness says (page 117): "The fourth claim contains as its elements, a retort and exhaust pump, a condensing coil and a capacious condenser interposed between the pump and the retort in such manner that it operates as a check to diminish the direct action of the exhaust pump upon the oil in the retort." This does not not lack much of being a fair statement of the claim. It omits, except as they are necessarily implied, the conduits by which the retort and the condenser are connected, and the receiver upon which the exhaust pump operates. But having thus stated the claim of the patent the witness proceeds to say that the distinguishing feature of this claim is the capacious condenser, which is, in substance, an enlargement of the conduit in which the vapors are condensed. Having thus selected one element out of several constituting together the plaintiff's invention, he attempts to demolish it by claiming to show that he finds condensers or enlarged spaces in passages for vapors in other patents. In his attack upon the third claim of the patent, which is really very little other than the fourth, although not quite so comprehensive, he selects as his point of attack the conduits called goose-necks, claiming that the distinguishing features of that claim is the two or more goose-necks. He might with equal propriety have selected the retort, or the receiver, or the pump, and made his attack upon each of these several elements.

The truth is that each of these claims involves the retort, the conduits connecting it with the capacious condenser, the condensing coil, the receivers and the exhaust pump by which the vacuum is produced. A glance at the defendant's different references I think is sufficient to show that neither one of them contains the combination which the patent covers and which is the invention it was designed to protect. The Reese patent, Exhibit A, the Higham patent, Exhibit B, and the Vander Wyde patent, Exhibit I, I have already sufficiently considered. The defendant seems to rely particularly upon the Gengebre patent, Exhibit G, page 164, and the Hamilton patent, Exhibit S. The last-mentioned patent wants the series of conduits and the capacious condenser which forms a conspicuous part in the plaintiff's device. The Gengebre patent, Exhibit G, is totally distinct in its object and purpose. It is a direct fire-still for the production of oil from minerals. It seems to lack every element of the plaintiff's apparatus and particularly the element of a vacuum, as the gases are returned directly into the retort which the plaintiff's witness says prevents the production of a vacuum, and that the pump operates as a circulating pump and not as a vacuum pump (page 131).

Exhibit E is the Perkins & Burnett patent, the specifications of which are found on page 160. The oil is heated in an entirely different manner. There is but a single conduit, no capacious condenser, no receiver, no vacuum, and the suction of the pump applied directly to the end of the worm, thus rendering the separation of the worthless vapors from the valuable impossible.

Exhibit K is the Gilbee, English patent, found at page 178. It is an apparatus for distilling fats by the injection of steam directly into the fats placed in the retort. There is no series of conduits, no capacious condenser, no continuous vacuum, no separation of the worthless vapors from the liquid.

Exhibit F is the Fleury patent, found at page 162. This lacks the series of conduits, the capacious condensers and the receivers between the pump and the condenser.

D is the Kelly & Tait patent, found at page 158. This apparatus consists in the arrangement of a series of retorts, one above another, connecting with each other by means of overflow pipes and into which steam is injected and from which the vapors pass into a receiver or condenser *E*, where the condensation is effected by the introduction of jets of cold water. It has scarcely an element in common with the plaintiff's device. There are no conduits, no condensing chamber, no vacuum pump and no receiver in which the separation of the products by the means of the pump takes place.

FIFTH CLAIM.

The defendant's witness, at page 118, says that the fifth claim of the complainant's patent involves as its elements the condenser, the vacuum pump and the receiving vessels in which the oil is collected as it flows from the condenser and which are arranged below the level of the tail pipe of the condenser and between the tail pipe of the condenser and the pump, so that the distilate flows from the tail pipe of the condenser, by gravity, into these receiving vessels, without passing through the pump. The references made to anticipate this claim are Exhibit I and S, the Vander Wyde and the Hamilton patents (pages 173 and 201), which have already been considered, and Exhibit H, the Tweddle patent, page 169. It lacks the condenser and the vacuum pump, and its operation is entirely different from that of the plaintiff's device.

THE SEVENTH AND EIGHTH CLAIMS.

I regard these claims as substantially the same thing and will consider them together. They claim the combination of a steam generator and an independent super-heating furnace constructed in such a manner as to economize the products of combustion and the waste heat of the super-heating furnace by turning them into the spaces of the steam generator with a vacuum still, as set forth. The references supposed to anticipate this claim are the Tweddle patent, Exhibit H, in which neither generator nor super-heater are shown; the Horner patent, Exhibit J, page 176, of which the same thing is true; the Kelly & Tait patent, Exhibit D, in which there is no independent super-heater, the super-heating being accomplished by running the pipes through the interior of the furnace only; and Exhibit Q, the Ewing patent, page 195, in which there is no allusion to a super-heater or to super-heating. Reference is also made to Exhibit U, Newton patent, page 207, in which there is no independent super-heater; Exhibit V, Elmer patent, page 211, a patent for improvement in the manufacture of gas, showing no independent super-heater, Exhibit W, the Bassett patent, page 217; also an improvement in the preparation of hydrogen and other gases, showing no independent super-heater; Exhibit X, the Howarth patent, page 220, of which the same thing is true, and Exhibit Y, the Werk patent, page 224, a patent for the improvement in the manufacture of fat acids, of which the same thing is true.

The decree should be reversed, with direction to the Circuit Court to enter a decree for the plaintiff for an accounting.

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